WTCI-122-P

Engineering Quality
Assurance Division

# Port Authority Facility Condition Survey Program

## 7 World Trade Center

FILE COPY

April 1997

*Engineering Department*

THE PORT AUTHORITY OF NY & NJ

AMMANN & WHITNEY

96 Morton Street, New York, NY 10014-3309

212.524.7200 Fax 212.524.7215

April 30, 1997

Mr. Ennala Ramabhushanam, P.E.
Manager, Quality Assurance Division
The Port Authority of New York and New Jersey
One World Trade Center, 51 North
New York, NY 10048

ATTN: Mr. Barry Feldman, P.E.
Project Manager

**RE: Expert Professional Services for the Performance of a Condition Survey Inspection of 7 World Trade Center**
**P.A. Agreement #405-96-15**
**A&W #1584**

Dear Mr. Feldman:

In accordance with the terms of our Agreement, submitted herewith are thirty (30) copies of the Final Baseline Condition Survey Inspection Report of Seven World Trade Center. Also included are 2 sets of the electronic files on 3.5 inch floppy diskettes, the original photographs and the original field notes.

This submission incorporates Port Authority personnel comments.

We trust that this submission meets with your approval. We appreciate the opportunity to be of service to the Authority on this project.

Very truly yours,

Christopher Gagnon
Assistant Vice President

RJS/rjs
Encl.

# I. EXECUTIVE SUMMARY

Ammann & Whitney, in association with Afridi Associates, a certified MBE, performed a Base Line Condition Survey of the Seven World Trade Center Building (7 WTC), during the months of November 1996 through January 1997.

The forty-seven story office building was constructed in 1987. The building was partly built over an existing two story reinforced concrete structure (the Con Edison substation), constructed in the late 1960's. In the last eight years several structural modifications were made throughout the building to accommodate Salomon Brothers Inc., a major tenant in the building.

This report is based on the inspection of selected floors as outlined in the scope. Only a limited number of floors were accessible however, the level of inspection was sufficient to provide enough data to assess the condition of the entire building.

The findings of our inspection indicate that the overall structural systems of the building are in very good condition with no sign of deterioration. One (1) Immediate Action item was found and corrected during the course of the inspection. No Priority Action items were noted. Many locations, however, require minor repairs and routine maintenance. In addition to the minor structural deficiencies, several safety conditions exist. The Immediate Action item and Safety items are listed below.

**Immediate Action**

1. Loose concrete on the north face of exterior column No. 51, on the 46th floor, in the cooling tower area, could fall to the street. The concrete was removed immediately by building management personnel, Silverstein Properties.

**Safety Items**

1. Wood planking and maintenance equipment were found on top of the lightweight ceiling over the loading dock area. Silverstein Properties personnel were informed of this condition and were told to remove the planking and equipment.

2. A motorized projection screen is supported from the lightweight ceiling carrier channels on the 25th floor adjacent to column No. 54.

3. On the 5th floor in the southwest corner transformer room, delaminated concrete on the underside of the 6th floor slab could break off and fall.

4. There are several ladders and access ways throughout the facility with loose bolts or substandard features. The descriptions and locations are listed in the body of the report.

In addition to the items listed above, some routine repairs are being recommended. For a description of these items see Section VI of this report.

## II.A. TABLE OF CONTENTS


I. Executive Summary ..... i

II. A. Table of Contents ..... iii
B. List of Photographs ..... iv

III. Scope of Work and Inspection Procedures

A. Scope of Work ..... 1
B. Inspection Procedure ..... 8
C. Inspection Terminology ..... 8

IV. Structure Description

A. 7 WTC Building ..... 11
1. History and General Information ..... 11
2. Structural Elements ..... 12
3. Roof ..... 13
4. Architectural Features ..... 14
5. Structure Modifications ..... 16

B. Substation (ConEd) ..... 17

V. Inspection Findings, Conclusions, and Recommendations

A. 7 WTC Building
1. Inspection Findings and Conclusions ..... 20
2. Recommendations ..... 32

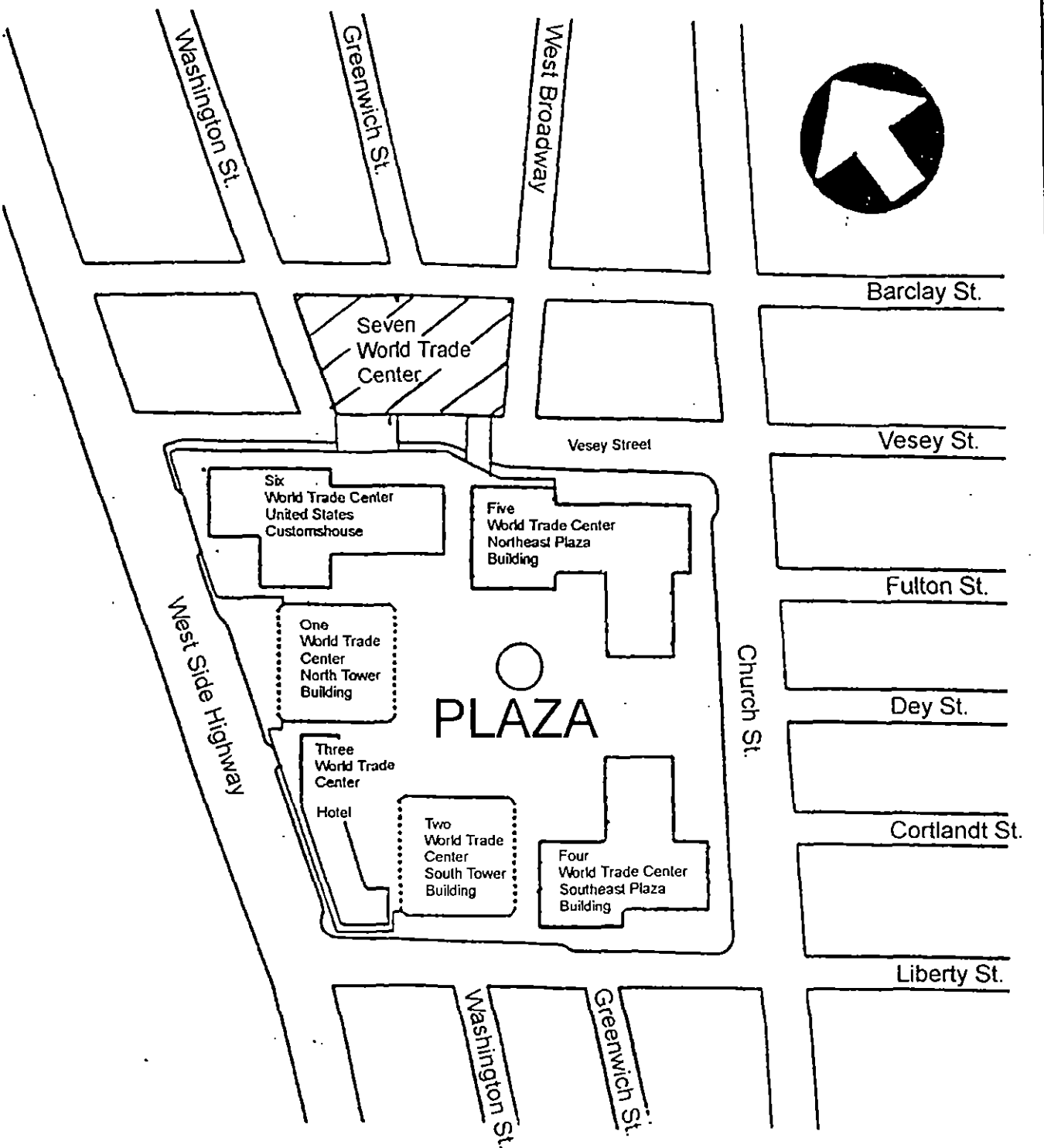
B. Substation(ConEd)
1. Inspection Findings and Conclusions ..... 34
2. Recommendations ..... 34

VI. *Layout Plans of Inspected Floors* ..... 35

VII. Field Notes (submitted under separate cover)

## II.B. LIST OF PHOTOGRAPHS


| Photo No. | Description | Page |
|---|---|---|
| 1 | South elevation of 7 WTC, looking from the Plaza level. | 18 |
| 2 | Pedestrian Bridge on the south side of building at the Plaza level, used as the primary access. | 19 |
| 3 | View of 7 WTC w/ Truck Ramp and ConEd Substation, looking southwest. | 19 |
| 4 | Chiller Plant and Cooling Tower housing on the 47th floor Main Roof. Note ponding of water. | 24 |
| 5 | Loose Concrete on the north face of Column No. 51 on the 46th floor in the Cooling Tower area. | 24 |
| 6 | Impacted rust between framing members on the 47th floor, north side of building above Cooling Towers | 25 |
| 7 | Wear and localized peeling of the Main Roof membrane. | 25 |
| 8 | Timber planking supported on top of the lightweight ceiling above the Loading Dock. This condition was reported to Silverstein Properties Management. | 26 |
| 9 | A motorized projection screen is supported from lightweight ceiling main carrying channels adjacent to Column No 54 on the 25th floor. | 26 |
| 10 | Looking up at a concrete patch in 6th floor slab. Note the excess concrete overhanging the patch limits. Also, note the broken piece of concrete. | 27 |
| 11 | Ladder in steam room on the 5th floor is too far from step off platform adjacent to Column No. 77. | 28 |
| 12 | Hatch door opening on the wrong side of the ladder to access the roof of the 48th floor penthouse | 28 |
| 13 | West ladder of Cooling Tower on the 48th floor, note loose bolts at rail splice and fall protection cage connection. | 29 |
| 14 | Missing and broken pipe supports on the fuel line in the 5th floor generator room on the south side of the building. | 29 |
| 15 | West ladder of Cooling Tower on the 48th floor, not secured at base. | 30 |
| 16 | Wide crack in brick on the west wall of the Cooling Tower Area on the 46th floor. | 31 |
| 17 | Efflorescence on underside of concrete trough beams inside the ConEd Substation at the roof level. | 34 |




# LOCATION PLAN

# III. SCOPE OF WORK AND INSPECTION PROCEDURE

## A. Scope of Work

Ammann & Whitney performed a baseline condition survey, for the Port Authority of New York and New Jersey, of Seven World Trade Center (7 WTC) during the months from November 1996 through January 1997. Ammann & Whitney retained the services of Afridi Associates, a certified MBE, as subconsultant on this project. In addition, we employed the services of A. Esteban & Company, a certified MBE, to produce color photostatic copies for the final report.

The scope of work for the field inspection was developed based on a detailed evaluation of the available contract drawings and the data gathered during our preliminary site visit. The selection of structural elements for the visual and in-depth inspection was based on the requirement to minimize the disruption to tenant operations.

The ceilings and the respective components were assessed based on the Port Authority "Ceiling Design Criteria" and "Ceiling Evaluation Criteria."

The Scope of Services include:

1. A field inspection that encompassed the designated areas in the building as presented in the following Section.
2. Preparation and submission of the Base Line Condition Survey Report

### Field Inspection

Prior to performing the field survey, a preliminary walk-through of the building was done and the necessary field forms, key plans, and schedules were developed. This was done in conjunction with the review of the available contract drawings. The field forms were then submitted to the Port Authority for approval. Also, the necessary field access and inspection equipment was arranged for or obtained through the Port Authority and Silverstein Properties Inc. Silverstein Properties provides Management service for the building.

The inspection was primarily a visual inspection with hands-on inspection of approximately 5% of the critical connections. The scope dictated that eight of the forty-seven floors would have the ceilings visually inspected for 100% of the surface area. The building would be divided into eight zones with six floors per zone. One of the six floors in each zone would be accessed for inspection. That floor would be representative of the other five floors in the particular zone. Thus, the work as outlined in the scope of work, was combined, as much as possible, to minimize the interruption to tenant operations.

This basic approach was modified, however, based on the preliminary walk-through which revealed that much of the framing was inaccessible due to the architectural cladding or concrete encasement. Furthermore, meetings with Silverstein Properties revealed that tenant requirements would make it difficult to perform the inspection as outlined in the scope. Therefore, the inspection scope was revised and limited to the unoccupied floors (mechanical/electrical and general service floors, ie., the 3rd, 4th, 5th and 6th) and those floors which have vacant space (7th, 10th, 18th, 23rd, 25th). The only floors that were completely occupied at the time of the inspection were the 43rd and the 47th. To meet these requirements the inspection procedures were also modified. The following is a summary of the floors which were accessed and the items which were inspected. For a complete listing of the locations accessed see Tables III-1 thru III-4 in Section III of this report.

Foundation

Although the foundations are completely concealed from view, the area around the column bases was inspected for signs of settlement.

Framing

The locations that were inspected for the Column Splices, Wind Bracing Systems and Interior Beam Connections are listed in Tables III-1 thru III-4 in this section.

The inspection of the framing members did not require removal of any fireproofing or architectural cladding (except ceiling tiles) unless our findings suggested that further investigation would be required. However, gypsum board cladding was partially removed at three exterior columns on the 23rd floor to provide access for inspection. Port Authority Personnel then repaired the openings in the gypsum board

Horizontal Diaphragm connections - 5th Floor

The horizontal diaphragms were not accessible because they are embedded in the 5th floor slab.

Facade

The facade inspection was not included in the scope of this report.

Roofs and Cooling Towers

The roofs and cooling tower supports received a 100% visual inspection.

Ceilings

The ceilings on selected floors (1st, 7th, 10th, 18th, 25th, 43rd) received a 100% visual inspection of the undersides. Other floors (3rd, 4th, 47th) received a 90% visual inspection of the undersides. The 10% difference accounts for some closets or equipment rooms that at the time of the inspection were not accessible. Randomly selected ceiling panels were removed so that the ceiling support framing could be inspected and the ceiling construction verified, including spacing of runners and hangers. The number of panels removed on each floor varied depending on accessibility and whether or not the framing above was visible. For the locations accessed see Table III-4 in this Section and the location plans in Section VI of this report. The ceiling support system was evaluated based on the current Port Authority Ceiling Design and Evaluation Criteria.

Con-Edison Substation

All exposed structural elements of the Con-Edison substation received a 100% visual inspection. The column splices between the substation and 7 WTC are not visible because the columns are completely encased in concrete. The column bases and footings are embedded in the floor slabs and therefore were also not inspected. There were no indications of any deficiencies to warrant further investigation. See Section V of this report for more in-depth findings.

Pedestrian Bridges

The pedestrian bridges are not included in the scope of this report.

TABLE III-1

| MAIN FRAMING | | | |
|---|---|---|---|
| COLUMN SPLICES - INTERIOR & EXTERIOR COLUMNS INSPECTION POINTS | | | |
| FLOOR* | NUMBER OF INSPECTION POINTS* | COLUMN Nos. | LOCATION OF CONNECTION |
| INTERIOR COLUMNS | | | |
| | | | |
| 5th | 3 | 58C (H), E3 & 79 | SEE PLAN |
| | | | |
| 23rd | 6 | 58(H), 59, 63(H) & 79 - 81 | SEE PLAN |
| | | | |
| EXTERIOR COLUMNS | | | |
| | | | |
| 5th | 10 | 46 - 55 | NORTH SIDE |
| | 9 | 19 - 27 | SOUTH SIDE |
| | 5 | 26.27(H), 39 - 41 | EAST SIDE |
| | 5 | 2, 3 & 12 - 14 | WEST SIDE |
| | 2 HANGERS | 25A & 26 | SOUTH SIDE |
| | | | |
| 23rd | 1 | 25 | WEST SIDE |
| | | | |
| | | | |

* *For locations see the Plan Views in Section VI.*

*(H) Hands On Inspection was performed at these locations.*

## TABLE III-2

| WIND BRACING SYSTEMS | | | |
|---|---|---|---|
| CORE - LOWER EXTERIOR - UPPER EXTERIOR INSPECTION POINTS | | | |
| **FLOOR*** | **NUMBER OF INSPECTION POINTS*** | **COLUMN Nos.** | **LOCATION OF CONNECTION** |
| **CORE** | | | |
| | | | |
| 1st | 4 | 64 - 73 | NORTH SIDE |
| 2nd | 4 | 64 - 73 | NORTH SIDE |
| | | | |
| **LOWER EXTERIOR** | | | |
| | | | |
| 5th | 10 | 43, 46 - 54 | NORTH SIDE |
| | 4 | 25, 26, 27(H), 28(H) | SOUTH SIDE |
| | 3 | 28(H), 29, 30 | EAST SIDE |
| | 4 | 12 - 14A | WEST SIDE |
| | | | |
| 6th | 2 | 28 - 29 | EAST SIDE |
| | 3 | 6 - 8 | WEST SIDE |
| | | | |
| **UPPER EXTERIOR** | | | |
| | | | |
| 23rd | 1 | 29 | EAST SIDE |
| | 1 | 12 | WEST SIDE |

* *For locations see the Plan Views in Section VI.*

*(H) Hands On Inspection performed at these locations.*

## TABLE III-3

| WIND BRACING SYSTEMS | | | |
|---|---|---|---|
| WIND GIRDER CONNECTION INSPECTION POINTS | | | |
| FLOOR* | NUMBER OF INSPECTION POINTS* | COLUMN Nos. | LOCATION OF CONNECTION |
| 5th | 3 | 16 -19A | SOUTH SIDE |
| | | | |
| 6th | 8 | 46 -54 | NORTH SIDE |
| | 1 | 55 -56(H) | NORTH SIDE |
| | 8 | 19 -27 | SOUTH SIDE |
| | 1 | 27 - 28(H) | SOUTH SIDE |
| | 5 | 28 - 30 & 38 - 41 | EAST SIDE |
| | 4 | 2 -3 & 12 -14A | WEST SIDE |
| | | | |
| 8th | 2 | 23 - 25 | SOUTH SIDE |
| | 2 | 28 - 30 | EAST SIDE |
| | | | |
| 19th | 5 | 21 -26 | SOUTH SIDE |
| | 1 | 26 - 27(H) | SOUTH SIDE |
| | | | |
| 24th | 4 | 44 - 46 & 53 - 55 | NORTH SIDE |
| | 3 | 25 - 28(H) | SOUTH SIDE |
| | 1 | 35 - 36(H) | EAST SIDE |
| | 2 | 5 - 6 & 9 - 10 | WEST SIDE |
| | | | |
| 44th | 1 | 42 - 43(H) | NORTH SIDE |
| | 3 | 32 - 33 & 37 -39 | EAST SIDE |
| | 1 | 41 - 42 | EAST SIDE |
| | 1 | 5 - 6 | WEST SIDE |
| | | | |
| MAIN ROOF | 1 | 57 - 1(H) | NORTH SIDE |
| | 1 | 4 - 5 | WEST SIDE |

* *For access locations see the Plan View for the floor below in Section VI.*

*(H) Hands On Inspection was performed at these locations.*

TABLE III-4

| FLOOR FRAMING | | |
|---|---|---|
| TYPICAL INTERIOR BEAM CONNECTIONS INSPECTION POINTS | | |
| FLOOR* | NUMBER OF INSPECTION POINTS * | LOCATION OF CONNECTION |
| 5th | 5 | SEE THE PLAN VIEW OF THE 3rd & 4th FLOORS |
| 6th | 4 | SEE THE PLAN VIEW OF THE 5th FLOOR |
| 8th | 6 | SEE THE PLAN VIEW OF THE 7th FLOOR |
| 11th | 6 | SEE THE PLAN VIEW OF THE 10th FLOOR |
| 19th | 5 | SEE THE PLAN VIEW OF THE 18th FLOOR |
| 24th | 10 | SEE THE PLAN VIEW OF THE 23rd FLOOR |
| 26th | 7 | SEE THE PLAN VIEW OF THE 25th FLOOR |
| 44th | 2 | SEE THE PLAN VIEW OF THE 43rd FLOOR |
| MAIN ROOF | 5 | SEE THE PLAN VIEW OF THE 47th FLOOR |

* *The Inspection Points are at the Ceiling Access Locations of the floor below, See the Plan views in Section VI*

## B. Inspection Procedure

Inspection Team Organization

Ammann & Whitney used one field inspection team for this project. This team consisted of a Team Leader, who is a licensed Professional Engineer and an Assistant Team Leader.

Inspection equipment

The inspection was performed on foot and from ladders. A manlift was required to inspect the lobby and the trading floor ceilings. Silverstein Properties, the building manager, and Salomon Brothers, the tenant of the trading floors, provided the manlift.

## C. Inspection Terminology

The following definitions are used to describe the rating of recommended repairs according to the Port Authority Structural Condition Standards:

**Immediate:** Requires immediate action, including possible closing of the structure or areas affected for safety reasons until interim remedial measures, such as shoring or removal of potentially unsafe structures (or elements), can be implemented. These closings or interim remedial actions, if any, always require immediate action upon discovery.

**Priority:** Conditions for which no immediate action may be required, or for which immediate action has been completed, but for which further investigation, designs, and implementation of interim or long-term repairs should be undertaken on a priority basis: i.e., taking precedence over all other scheduled work.

**Routine:** Conditions requiring further investigation or remedial work which can be undertaken as part of a scheduled maintenance program, of other scheduled project, or routine facility maintenance depending on the action required.

The following terms are used to rate the condition of the structural systems or individual elements. When a term is applied to an overall system, it does not mean that some element of the system may not be in a different condition.

**Excellent:** Element in as-new condition.

**Good:** Element is sound and performing its functions although it shows signs of use and may require some minor repairs, mostly routine.

**Fair:** Element is still performing adequately at this time but needs priority and/or routine repairs to prevent further deterioration and to restore it to good condition.

**Poor:** Element cannot be relied upon to perform its original function without immediate and/or priority repairs.

The following terms are used to describe the corrosion on steel members:

**Minor:** A light surface rust.

**Moderate:** Rust that is loose or flaking with some pitting. This scaling, or exfoliation, can be removed with some effort by use of a scraper or chipping hammer. Element exhibits measurable but not significant loss of section.

**Severe:** Heavy, stratified rust or rust scales with extensive pitting. Removal requires exerted effort and may require mechanical means. Element exhibits significant loss of section.

**Impacted Rust:** Corrosion collected between two interfacing surfaces, usually two steel plates. Impacted rust can be minor, moderate, or severe as described above. Impacted rust can severely deform steel members due to the expansive nature of the rust.

**Pitting:** Formation of cavities due to corrosion. Minor, moderate, and severe pitting categories are used based on the depth and density of cavities.

The following terms are used to define cracks in masonry and concrete:

**Crack:** A separation in two or more parts with space between a fracture in the concrete.
Hairline: Crack width less than 1/32 inch.
Fine: Crack width between 1/32 inch and 1/16 inch.
Medium: Crack width between 1/16 inch and 1/8 inch.
Wide: Crack width greater than 1/8 inch.

The following terms are used to describe the other deficiencies of concrete members:

**Efflorescence:** A deposit caused by crystallization of soluble salts brought to the surface by moisture leaching through the concrete.

**Delamination:** A layered separation of the concrete, When a delaminated area of concrete is struck (sounded) with a hammer, a hollow sound will be emitted.

**Leaching:** The dissolution and washing away of the calcium hydroxide in the concrete. The moisture enters the concrete through cracks open to the surface.

**Spall:** A roughly circular, oval or elongated depression in the surface of a concrete element caused by a separation of that portion of the surface concrete.

| | |
|---|---|
| Small (Pop-out)- | Less than 6 inches in diameter and 1 inch deep. |
| Medium- | between 6 inches and 12 inches in diameter and up to 2 inches deep. |
| Large- | Over 12 inches in diameter and any depth. |

**Scaling:** The gradual loss of surface mortar and aggregates.

| | |
|---|---|
| Light- | Loss of surface mortar up to 1/4 inch deep. |
| Medium- | Loss of surface mortar between 1/4 and ½ inch in depth, including loss between large aggregates. |
| Heavy- | Loss of mortar greater than ½ inch in depth, significantly exposing large aggregate. |

**Hollow Area:** An area of concrete which emits a hollow sound when struck with a hammer, indicating the existence of a fracture plane (delamination) beneath the surface.

# IV. STRUCTURE DESCRIPTION

## A. 7 WTC Building

### 1. History and General Information

Seven World Trade Center, located at the World Trade Center facility, is a steel framed forty-seven story office building. See Photo No. 1 at the end of this section. The lot the building encompasses is the block between Barclay and Vesey Streets and Washington Street and West Broad Way. The building was constructed in 1987 and partly founded over an existing two story reinforced concrete structure (Con Edison Substation), constructed in the late 1960's. Several large conduit boxes pass under the building traversing from north to south.

In the past eight years a number of structural modifications were made throughout the building to suit Salomon Brothers Inc., a major tenant in the building. Currently, Salomon Brothers leases twenty-five of the forty-seven floors. One of the more substantial modifications is the addition of a penthouse on the now 48th floor. It is used to house the chiller plant and the cooling towers for Salomon Brothers. The intention of this and other modifications is to provide Salomon Brothers with complete independent operations from the main building. A list of known modifications is provided under the Structure Modifications subsection.

The first six floors are unoccupied by tenants. Tenant office space does not begin until the 7th floor. The 1st and 3rd floor are the lobbies and building management offices. Also, on the 3rd floor is a convention facility. On the 2nd floor is an auditorium. This is on the east side of the building and is only accessible from the 3rd floor convention facility. A kitchen/cafeteria and dining facility completely occupy the 4th floor. The 5th and 6th floors house the main mechanical and electrical equipment for the building.

The main entrances are on the south side, from either the Vesey street level or the Plaza level. The Vesey Street entrance opens to the 1st floor lobby. The Plaza level entrance opens to the 3rd floor level or the main lobby. Access from the Plaza is via a partially enclosed pedestrian bridge or the Plaza Extension, which acts as a bridge near the southwest corner of the building. See Photo No. 2 on page 19. Both structures are supported at the plaza level on the south side of Vesey Street and by the exterior framing of the building.

On the south side of the building at the 46th floor level is a setback for approximately eight and one half feet. The south wall from this level up is all glass and is sloped back to the top of the parapet on the 47th floor main roof.

## 2. Structural Elements

Foundation

The foundation for the building is on drilled caissons and steel encased concrete pipe piles. There are approximately 80 columns, half of which are integral with the substation. The foundations for the core columns have grillages to provide stability for the two structures. The north core wall is the same as the south wall of the switchgear room in the substation.

At the northeast corner of the building is located the entrance to the truck ramp which provides access to the underground parking facility of the World Trade Center Complex. The ramp goes from north to south and runs under the east side of the building parallel to West Broadway.

Framing

The frame consists of approximately eighty steel columns which are spliced at every other floor. The columns shared with the substation are columns 1 - 8, 45 - 55, 58A, 58C, 61, 64, 67, 70, 73 and 79 - 81. The splices for these columns are just above the third floor level in the main office building. The sizes of the main framing members typically range from W21s to W36s and are composite with the deck. On the 5th and 6th floors however, the framing changes to allow more head room and floor space for equipment.

The north face of the building, between columns 47 and 54 are cantilevered out over the original substation columns 47A to 54A approximately seven feet. On the 4th floor the cantilever is picked up by the moment connections to the offset Column Nos. 47A thru 54A (see Fig. 2 in Section VI). On the 7th floor are large plate girders, which span from the core columns and cantilever out over the offset columns, to the north fascia. These cantilevered girders pick up the loads from the exterior columns 47 thru 54, which support the 7th thru 47th floors (see Fig. 2 for a schematic view of this area). The load from the 5th ans 6th floor fascia columns is distributed between the cantilevered plate girders on the 7th floor and the cantilevered W27's on the 4th floor.

On the south face of the building columns 26 and 27A are hangers. They are supported from the truss framing connections on the 5th and 6th floors and support the 1st thru 5th floors. On the north face of the building Column No. 47 performs a similar function however, it only supports the 3rd thru 5th floors. The hangers are used because individual foundation for these columns was not feasible due to the possibility of encroaching on the existing truck ramp directly beneath those locations.

On the north side of the main roof level the steel framing is exposed where it spans over the Cooling Tower Area. At this location the horizontal framing is built up with two wide flange sections resting on top of one another. This serves to stiffen the wide flanges and to support the open steel grating used over the Cooling Tower Area. Intermittent welds running the full length of the beam are used to tie the members together (see Photo No. 6 on page 25.) The Framing at this location is painted.

Lateral Load Resisting Systems

Wind and seismic forces are resisted by the core section, which is braced up to the 7th floor. In addition, there is a combined system of bracing and moment resisting frames around the perimeter of the building. The horizontal forces are transferred to a diaphragm system on the 5th floor and the concrete floor slabs on each floor. A diagonal bracing system acts to resist the wind and earthquake forces. This bracing system is located along the exterior of the building (lower and upper portion) and at the core of the building. The lower exterior bracing system extends along the north-south faces between the 5th and 7th floors, while on the east-west faces, the bracing extends from the 1st to 7th floors. The upper exterior bracing system described herein as "Belt Truss" extends between the 22nd and 24th floors on all four sides of the building.

Floor Systems

The typical floor system is a 6 or 8 inch deep cast-in-place, reinforced stone concrete slab placed over a three inch deep 20 gauge composite metal deck. Several floors are different depending on the usage. Specifically, the 5th floor slab, which is 1'-2" thick to accommodate the horizontal diaphragms embedded in it. The 7th floor is a conventional reinforced concrete 8" slab supported on the framing completely, which is completely encased in three inches of concrete.

Due to Salomon Brothers requirements a large portion of the 41st and the 43rd floors were removed on the east side of the building. This was done to accommodate the trading floors. The floor slab is the same as the typical except the slab thickness of five inches.

**3. Roof**

There are five roof areas. The 45th floor roof (46th floor level) which houses the buildings main cooling tower facility, the 45th floor roof setback area on the south side of the building, the 47th floor main roof, the 48th floor chiller plant/penthouse roof, and the 48th floor bulkhouse facility roof.

The 45th and the 47th floor roofs are constructed of a 4 inch cast-in-place reinforced stone concrete slab placed over a 1 ½ inch deep 20 gauge composite metal deck. On top of the slab is a recently installed waterproofing membrane. The original design called for the surface to be similar to the bulkhouse roof.

The bulkhouse roof is constructed of a lightweight six and a half inch stone concrete slab placed on top of a three inch deep 20 gauge composite metal deck. On top of which is a 2 ½ inch thermal fiber layer of waterproofing membrane and a course of gravel.

The parapets are approximately 3 ½ feet high and go around the perimeter. The roof waterproofing membrane is turned up at the parapets and acts as flashing. The parapets are capped with a formed aluminum coping. Set into the inside face of the parapets are electrical outlet boxes. These boxes are located in several places so that power can be brought to the window washing equipment.

The 48th floor chiller plant roof is covered with a solid rubberized membrane. The membrane is turned up at the ends where the end formed aluminum coping. There is no parapet however, a galvanized steel pipe rail goes around the perimeter and is set back from the edge of the roof by approximately 1 ½ feet.

The window washing rigging is made to travel around the main roof level on a concrete slab which was designed specifically for this purpose. The slab currently has the waterproofing membrane on top of it. There are stations around the perimeter where the rigging can be anchored. On the Set Back roof the rigging is supported by brackets which are anchored to the parapet wall.

**4. Architectural Features**

Facade

The fascias consist of glass windows and granite panels that are 1 1/4 inches thick and vary in height and width from approximately 4ft by 4ft. to 4.5ft by 6.5ft. The panels are hung from clips which are anchored to the fascia framing which not only supports the panels but also supports the window frames.

The fascias of the walls for the Cooling Tower Area on the 46th floor are brick, except the north wall which consists of steel louvers for the full height and length.

Ceilings

The typical ceiling type is a lightweight suspended ceiling and usually two-by-four acoustical drop in tiles were used. In the lobby however, sheet metal panels were used. These are supported by spring clips which clip into the suspended tees. Another type of ceiling used is of lightweight gypsum board. These are commonly used in the elevator lobbies and as soffits along the perimeters of the drop ceilings (see Table IV-1 below for locations and types of ceilings). The average height of the ceiling is 8 ½ feet. There are exceptions such as the lobbies and the trading floors where the ceiling height exceeds twenty feet. See Figure (1) in Section VI of this report for a detail of the typical ceiling construction.

TABLE IV-1

| LOCATIONS AND TYPES OF LIGHTWEIGHT CEILINGS | | | | |
|---|---|---|---|---|
| FLOOR | DROP- IN PANELS | CONCEALED SPLINE | GYPSUM BOARD | TYPE OF CONSTRUCTION |
| 1st | | | Lobby Mezzanine | Main carrying channels at 52" supporting gal 15 gauge runners with spring clips at 16" on ctr. The entire system is hung from 1/4" rod hangers spaced at 54".Threaded studs shot into the metal deck above support the rod hangers from eye hooks. |
| 1st | | | Loading Dock area | Main carrying channels at 52" supporting gal 15 gauge runners with spring clips at 16" on ctr. The entire system is hung from 1" x 1/8" strap hangers spaced at 54". |
| 3rd | Main Lobby 28" x 28" sheet metal panels, with spring clip supports | | | Main carrying channels with tees supporting the panels similar to Fig. 4. Spring clips are slipped thru slots on the tee bar. |
| 5th | | | | No Ceilings |
| 6th | Acoustical tile in Storage area and Maintenance offices | Locker Rooms and Bath Rooms | | See Fig. 4 in Section VI |
| 7th | Acoustical tile over entire floor | Bath Rooms | | See Fig. 4 in Section VI |
| 10th | Acoustical tile over entire floor | Bath Rooms | | See Fig. 4 in Section VI |
| 18th | Acoustical tile over entire floor | Bath Rooms | | See Fig. 4 in Section VI |
| 23rd | | Bath Rooms | | No Ceilings |
| 43rd | Acoustical tile over entire southwest and west side of floor | | Trading area and Executive Offices | See Fig. 4 in Section VI |
| 47th | Acoustical tile over major portion of floor | Fitness Center | | See Fig. 4 in Section VI |

Fire Retarding System

All structural steel framing, undersides of composite metal deck floor slabs and certain portions of the exterior walls are coated with, a sprayed on fire retardant. Structural steel without the sprayed on fire retardant, has been completely encased in concrete.

**5. Structure Modifications**

Tenant Space

Since the facility has gone into service there have been several major changes to the structure, all of which are known to be made for Salomon Brothers Inc. While reviewing the following modifications refer to the corresponding plan views in Section VII of this report.

The Convention Center area, on the 3rd floor, between column nos. 45 and 48A has had steel plates installed all around the perimeter of the room. The steel plates are between the slab and the floor surface, behind the wall coverings and above the suspended ceiling. The north wall has windows. According to the maintenance personnel this work was done to protect the attendees from the magnetic field generated from the ConEd Substation directly beneath the conference rooms in the Center.

In the generator room on the north side of the 5th, floor masonry block walls have been added to partition the 8 transformer vaults installed for Salomon Brothers. The vaults are between Column Nos. 46 and 53.

The 41st and 43rd floor slabs have been completely removed on the east side of the building thereby, making the ceiling height doubled for both floors. The only framing members that remain from the original design are the columns and the wind girders. This was done to accommodate the trading floors for Salomon Brothers Inc.

The 48th floor penthouse was constructed to house the chiller plant and the cooling towers for Salomon Brothers Inc. The chiller plant is an enclosed steel framed structure with corrugated steel walls. It is approximately 25 feet in height and takes up approximately 1/3 of the square footage on the original 47th floor roof.

The cooling towers, which are also on the 47th floor roof are accessed through the chiller plant. The cooling tower units are supported on a steel frame such as the ones on the 46th floor. They are enclosed by louvered walls on the north and south sides and by the chiller plant and the bulkhouse on the east and west sides respectively (See Photo No. 4 on page 24.)

## B. Substation (ConEd)

The structure is a two story reinforced concrete building which houses the transformers, switchgears, and feeders for the power supplied to many of the facilities in the downtown area (see Photo No. 3 on page 19.)

The foundation for the substation comprises drilled-in caissons and steel pipe piles. Modifications were made to the existing foundations by adding grillages to support the superstructure of the 47-story building. The structural framing is a combination of reinforced concrete and concrete encased steel beams or columns. The floor system is a cast-in-place reinforced concrete slab. The roof consists of a reinforced concrete slab and precast panels. The exposed roof area has open grating for the transformer vaults below. The first floor level is at EL. 303 which is approximately street level, the second floor is at EL. 318.5 and the top of the roof is at EL. 335. This is the same elevation as the third floor in 7 WTC. The third floor in 7 WTC is integral with the roof of the substation; on the north side from the core Column Nos. 61 thru 73 to the north face of 7 WTC, on the west side from the core Column No. 64 to the west face of the building and on the east side from the core Column Nos. 73 thru 75, to the inside wall of the truck ramp (see the Substation Plan in Section VI of this report.)

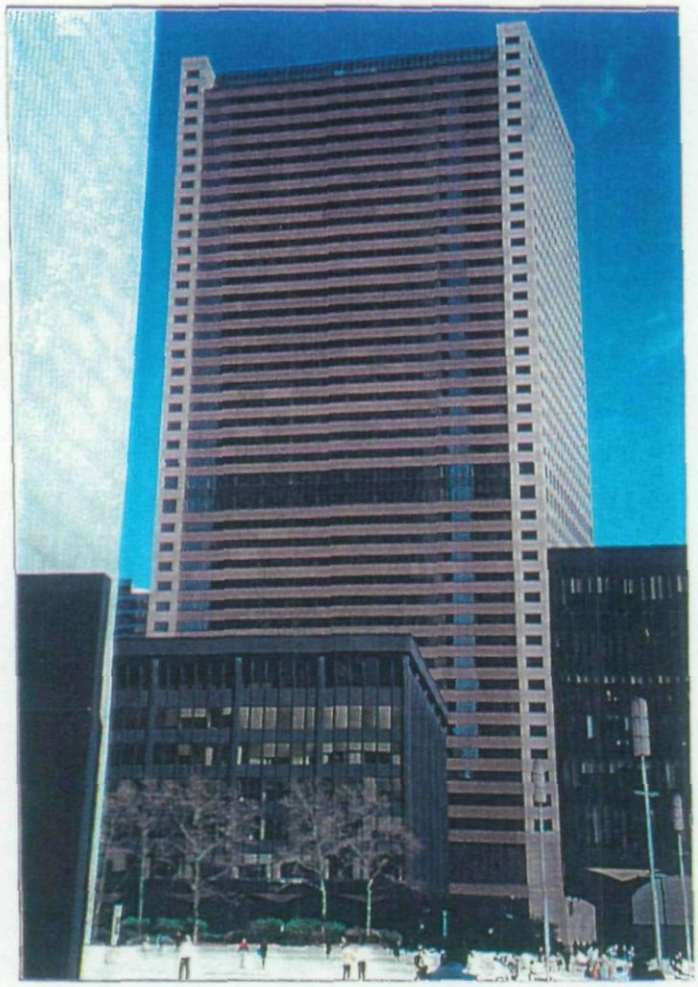


Photo No. 1: South elevation of building, looking from the Plaza level.

Photo No. 2: Pedestrian Bridge on the south side of building at the Plaza level is used as the primary access.

Photo No. 3: View of 7 WTC w/Truck Ramp and the ConEd Substation looking southwest.

# V. INSPECTION FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

## A. 7WTC Building

### 1. Inspection Findings and Conclusions

This section includes a general overview of the condition of the critical components inspected and a detailed description of the findings and items to be addressed. The specific locations of those components which were inspected see Tables III-1 thru III-4 in Section III.

Photographs of the findings are at the end of this section. In addition plan views of specific floors inspected, provided in Section VI, indicate the approximate locations of the items to be addressed.

Foundations

Although the foundations were concealed from view, there is no indication of any settlement or deterioration. Therefore, there is no need to further investigate them.

Framing

**The structural framing is in good condition with little or no deterioration found.** However, loose concrete was found on the north face of column no. 51 on the 46th floor of the cooling tower area. This condition was a potential hazard and considered an immediate action condition. Therefore, the loose concrete was **removed** immediately by Silverstein Properties personnel (see Photo No. 5 on page 24.)

There is impacted rust building up between the flanges of the members which rest on top of one another at the Main Roof level, where the steel framing is exposed. The current condition is not a structural problem and is considered a routine maintenance item. However, the steel should be cleaned and painted to prevent further deterioration (see Photo No. 6 on page 25.)

There was no indications of any problems or deterioration on the Column Splices, the Wind Bracing or the Interior Beam Connections.

Throughout the facility fireproofing had been removed from the steel framing, to install utility supports and it has not been replaced. This condition was found on all the floors which were inspected but it was more prominent on the 5th floor framing above the Main Lobby and the 2nd floor framing above the Loading Dock area. It is recommended that the fireproofing be replaced as needed during the renovations of the effected offices.

Floor Slabs

**The floor slabs are in good condition.** Some exposed floor slabs exhibited shrinkage cracks on the top sides and some had the composite sheet metal form pans damaged during construction. Neither of these conditions poses a structural problem.

On the 5th floor, in the transformer room, at the southeast corner of the building, a concrete patch was placed in the 6th floor slab above. Excess concrete overhangs the limit of the patch and has a hollow sound when struck with a hammer. This is an indication that the bond between the excess patch material and the bottom of the 6th floor slab is not adequate and that the excess concrete could break off. This condition does not require immediate action, because it is in a limited access area. However, the excess concrete could loosen and fall. Therefore, this condition is considered to be a safety item and the delaminated concrete should be removed (see Photo No. 10 on page 27.)

Roofs and Cooling Towers

**The roofs are in good to fair condition.** Water stains are evident on the roof surface of the 46th floor setback. Wear and localized peeling of the membrane is occurring on the Main Roof (see Photo No. 7 on page 25.) The locations where the roof is worn should be patched to prevent water from penetrating the roof deck and causing damage to the structural systems. This condition is a routine repair item.

On the southeast side of the Main Roof, next to the penthouse/chiller plant, water is ponding (see Photo No. 4 on page 24.) This condition is also present on the south side of the 48th floor roof. At this time the condition does not present a structural problem and no action is required.

The parapet height on the main roof was originally designed to be 42 inches. It was measured to be 40 inches. This difference may be attributed to a change in the roof detail when the modifications for Salomon Brothers were incorporated. This condition requires no action.

The brick fascia on the exterior walls of the Cooling Tower Area on the 46th floor is exhibiting cracks approximately a 1/4 inch wide (see Photo No. 16 on page 31.) The cracks run from the base to the top of the wall. They were found in the middle of the west wall and in the south wall where there is a penetration for a large pipe duct. At the time of the inspection there were no signs of structural damage or deterioration from water but these cracks should be sealed as routine maintenance to prevent water from infiltrating.

On the 47th floor roof there are electrical outlets mounted on and embedded in the fascia of the parapet around the perimeter of the building. Several of these are loose in their housings and are allowing space where water can infiltrate behind the roof membrane. Secure and seal the outlets as routine maintenance.

The brackets, on the 46th floor setback roof, which support the scaffolding for the window washing equipment were designed with a crevice which is permitting moisture and dirt to collect. The moisture has deteriorated the protective coating and is causing the base material to rust. Clean and paint the brackets, then provide a cap for the crevice. This should be done under routine maintenance.

Temporary window washing equipment is being used on the north side of the building. The equipment is stationed on the north side of the 47th floor roof. Wire ropes are used to tie back the rigging and to stabilize the equipment while being used. Currently, the wire ropes are tied back to the exposed roof framing over the cooling towers. The wind is vibrating the ropes and forcing them to abrade against the steel they are attached to. This action is causing the protective coating on the steel and the wire rope to wear (see Photo No. 6 on page 25.) Remove the wire ropes and provide adequate support for the temporary window washing equipment to the existing tie back system. This should be done under routine maintenance.

Ceilings

Ceiling panels were accessed at various locations. Floor plan layouts, contained in Section VII of this report, indicate these inspection access locations.

**Overall the ceilings are in good condition** except in a few locations where they require routine repairs. On the 7th floor, approximately 26 feet north of Column No. 24 the carrying channel is unsupported and is left resting on the top of the ceiling (see Photo No. 8 on page 26.) This is causing the main carrying channel to be unsupported for over 7 feet. However, there is no sign of distress or bulging. Although the present condition does not meet PA Design Criteria, it does meet the PA Ceiling Evaluation Criteria.

On the 25th floor, approximately 6 feet north and west of Column No. 24, an anchor which supports the rod hanger has pulled out leaving the carrying channel unsupported for over 6 feet. However, there was no distress or bulging found in the ceiling. A similar condition exists on the 10th floor, approximately 6 feet south of Column No. 42. These conditions also meet the PA Ceiling Evaluation Criteria.

The lightweight ceiling above the loading dock is constructed of gypsum board. The carrying channels are spaced at 54 inches, supported by 1" x 1/8" strap hangers and main runners spaced at 16 inches. Timber planking, several boards wide, is laying on the top of the ceiling for the entire length. The planking is supported by the ceiling and the adjacent utility piping. This condition is considered a safety item and the planking and equipment on the ceiling shall be removed (see Photo No. 8 on page 26.) Silverstein Properties was informed of the conditions and recommendations.

A motorized projection screen is located on the 25th floor, just west of column 54. The screen is supported from the lightweight ceiling carrying channels. There is no evidence of bulging or distress and the ceiling is in good condition. However, the screen should either be removed or supported from the structural elements above or removed and the ceiling should be repaired. This is considered a safety item (see Photo No. 9 on page 26.)

Throughout the facility there are many ladders and access ways which are used for maintenance purposes. A spot check of these systems was performed while using them to access areas designated for the inspection. Several conditions regarding this equipment were found to be substandard and are considered to be safety items. These conditions should be addressed as soon as possible. They are listed below:

1. The ladder in the 5th floor steam room, adjacent to Column No. 77, is offset from the landing beyond the maximum allowed distance and is not oriented properly with respect to the same landing (see Photo No. 11 on page 28.) Provide a new platform that conforms to OSHA standards.

2. Loose anchor bolts were found in some of the supports for the ladders in the 5th floor steam room and on the access ladder to the 43rd floor East MER. Tighten the anchor bolts.

3. The 4 ladders which access the Cooling Tower Framing from the 46th floor level are not secured properly at the bases. These ladders are on the 4 corners of the Cooling Tower Framing. Secure the ladders at the bases and seal properly to prevent moisture from entering the roof membrane.

4. The hatch to the 48th floor roof level opens on the wrong side of the ladder (see Photo No. 12 on page 28.) Replace the existing hatch with a new one that conforms to the OSHA standards.

5. The ladder on the west side of the cooling tower on the 48th floor has several safety conditions. The ladder is not fitted with the proper fall protection cage. The limits of the cage start too high up from the roof level. Also, the bolts in the rail splices are loose and the ladder is not secured at the base (see Photo Nos. 13 & 15 on pages 29 and 30.) Replace the existing cage with a new one that conforms to the OSHA standards and secure the ladder at the base as done in item 3 above

Miscellaneous

Several pipe supports are missing or have been disconnected from the fuel lines in the 5th floor generator room on the south side of the building. The pipes are approximately two inches in diameter and are spanning over 15 feet between supports. The broken and missing supports should be replaced as a routine repair. (See Photo No. 14 on page 29.)

Photo No. 4: Chiller plant and cooling tower housing on the 47th floor Main Roof looking west. Note, the ponding of water against the curb at the chiller plant.

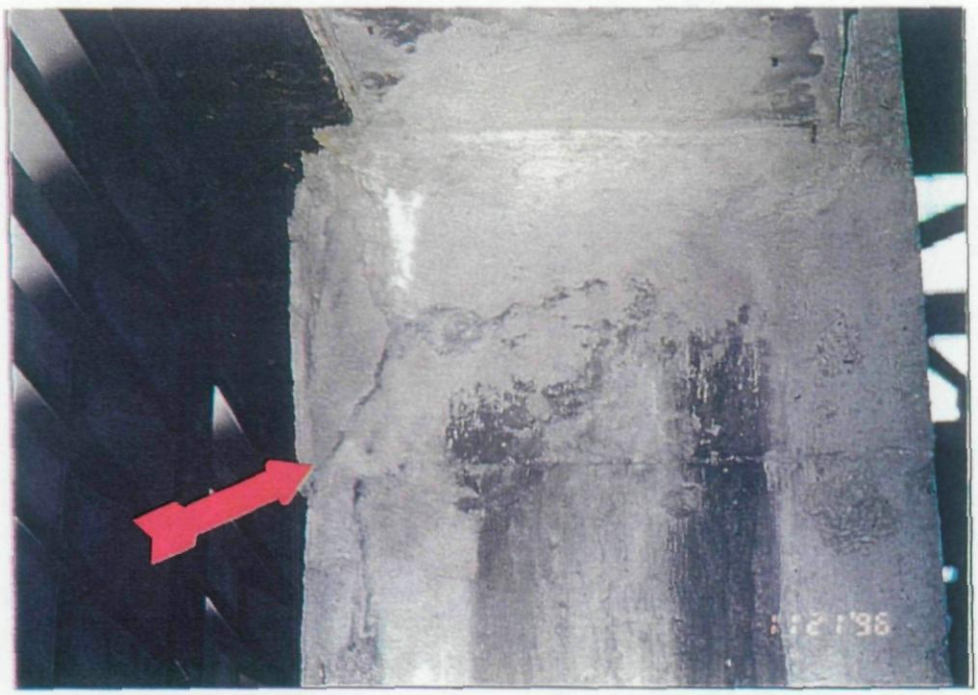


Photo No. 5: Loose concrete on the north face of Column No. 51 on the 46th floor of the Cooling Tower area.

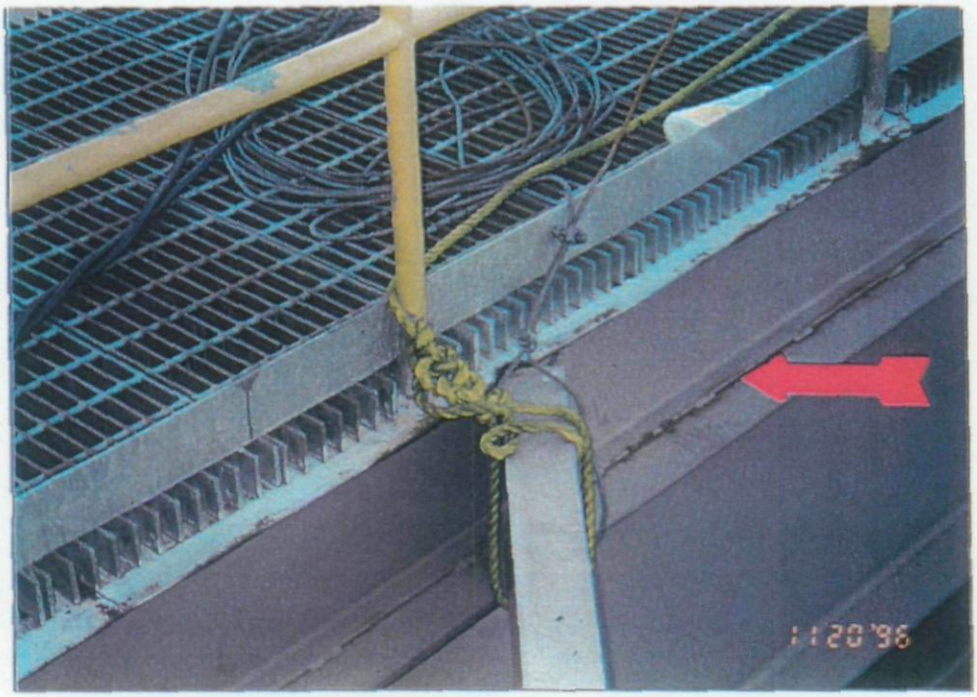



Photo No. 6: Impacted rust between framing members of 47th floor north side of building above Cooling Towers. Note the intermittent weld.

Photo No. 7: Wear and localized peeling of Main Roof membrane.

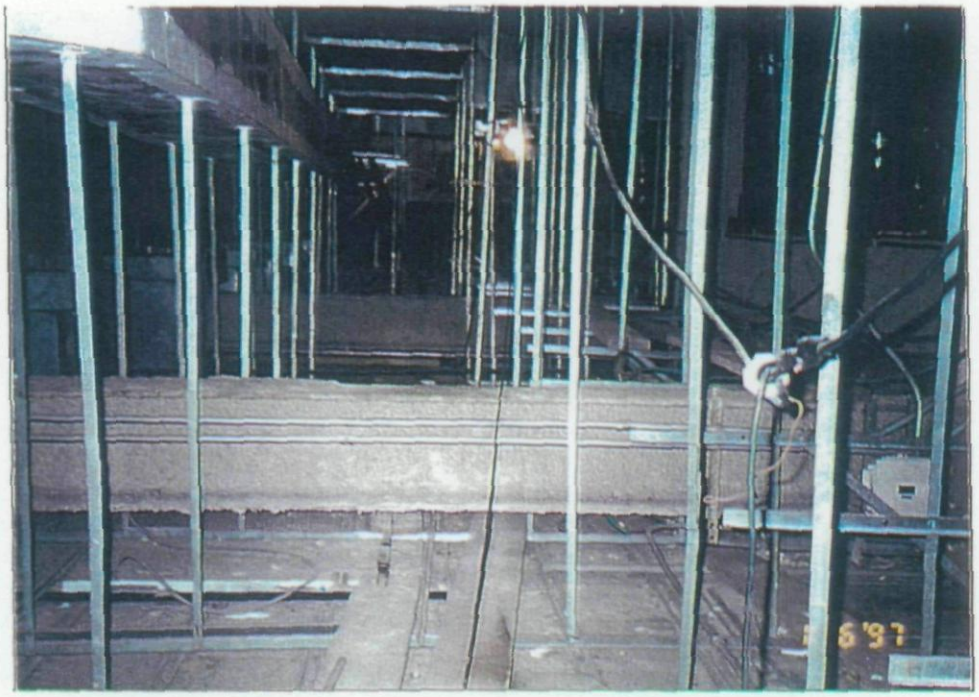


Photo No. 8: Timber planking supported on top of the lightweight ceiling above the Loading Dock. This condition was reported to Silverstein Properties Management.

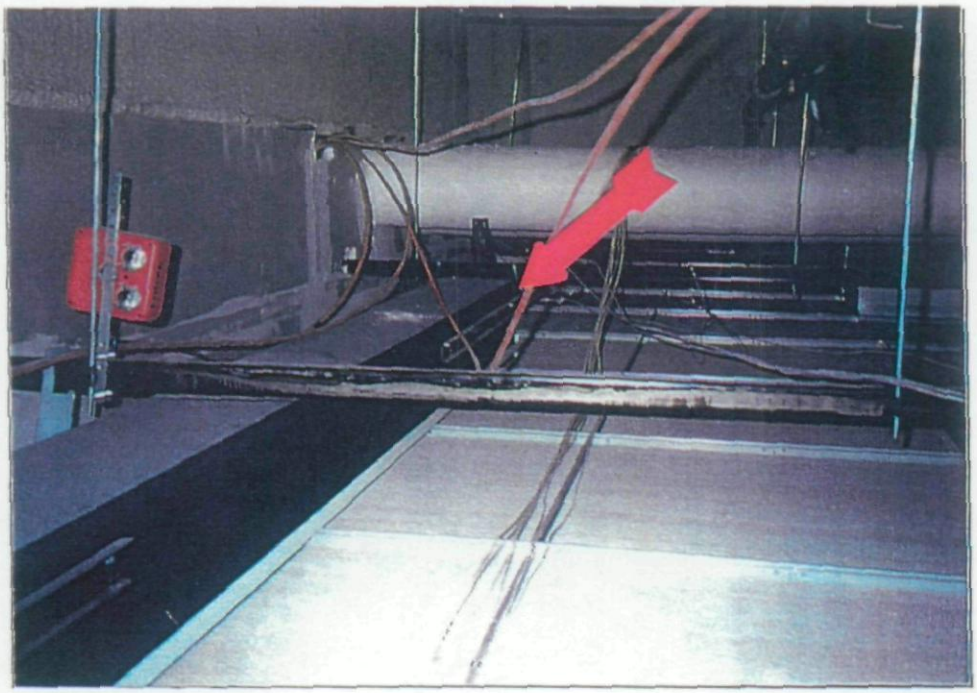


Photo No. 9: Projection screen is supported from lightweight ceiling main carrying channels adjacent to Column No 54 on the 25th floor.

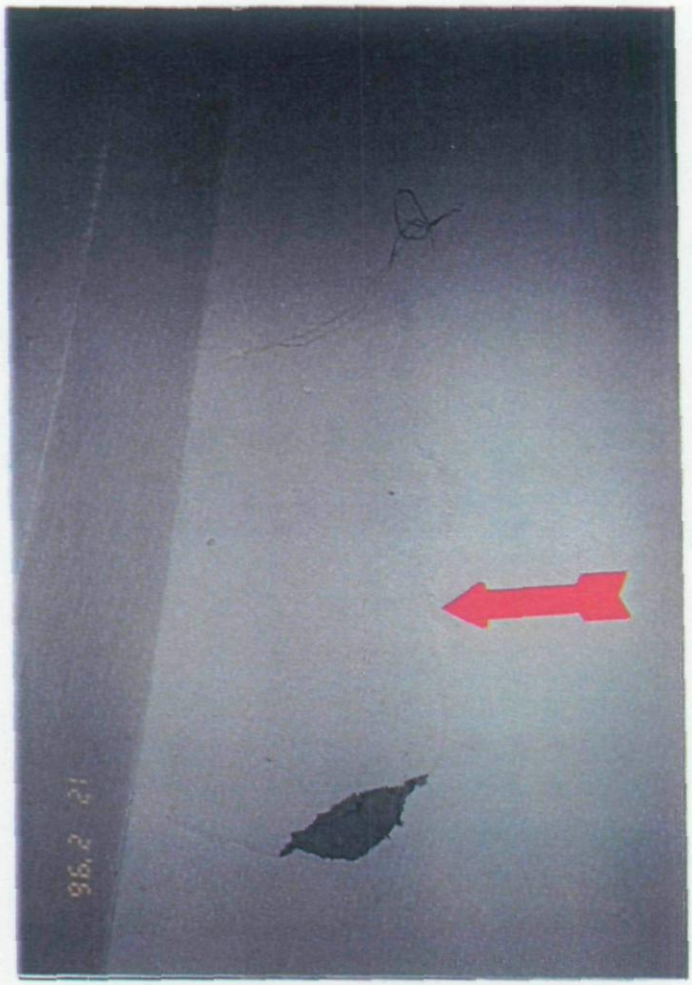


Photo No. 10: Looking up at a concrete patch in 6th floor slab. Note the excess concrete overhanging the patch limits. Also, note the broken piece of concrete.

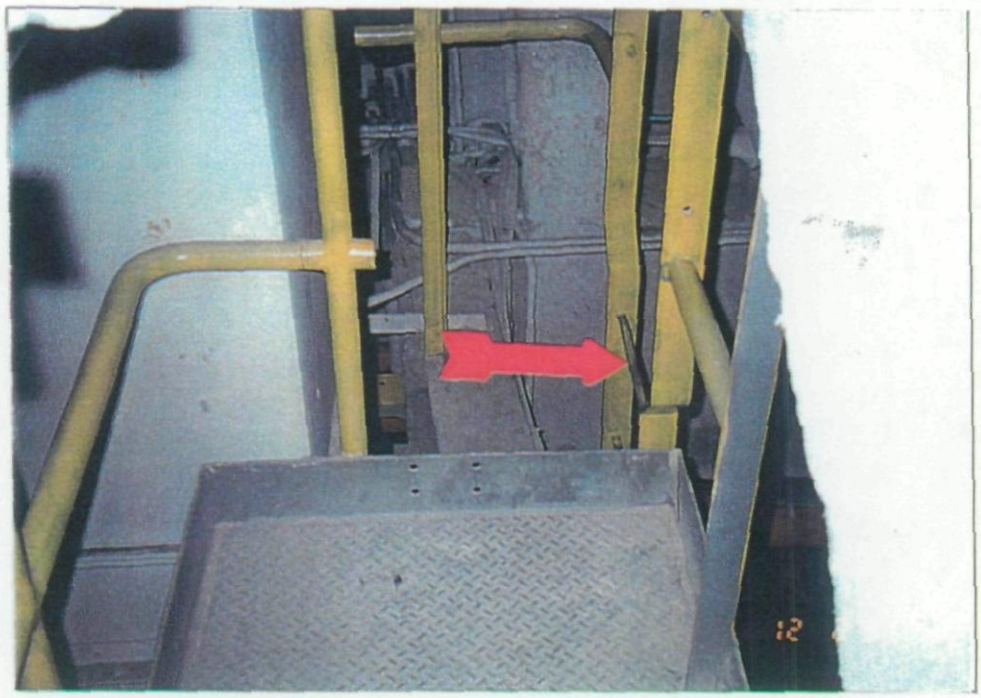


Photo No. 11: Ladder in steam room on the 5th floor is too far from step off platform adjacent to Column No. 77.

Photo No. 12: Hatch door opening on the wrong side of the ladder to access the roof of the 48th floor penthouse.

Photo No. 15: West ladder of Cooling Tower on the 48th floor is not secured at base.

Photo No. 16: Wide crack in brick on the west wall of the Cooling Tower Area on the 46th floor.

## 2. Recommendations

| IMMEDIATE ACTION | | | | |
|---|---|---|---|---|
| ITEM | FLOOR | LOCATION | DESCRIPTION | PHOTO |
| 1 | 46th | Cooling Tower area | Loose concrete on the outside face of Column No. 51, on the 46th floor, in the cooling tower area was removed by building management personnel | 5 |

| SAFETY ITEMS | | | | |
|---|---|---|---|---|
| ITEM | FLOOR | LO CATION | DESCRIPTION | PHOTO |
| 1 | 2nd | Ceiling above Loading Dock area | Several widths of planking and maintenance equipment are resting on top of the ceiling and should be removed as soon as possible. | 8 |
| 2 | 5th | 5th floor steam room adjacent to column no. 77 | Ladder in steam room is offset from the landing beyond the maximum required. Provide a new platform which conforms to OSHA standards. | 11 |
| 3 | 6th | 5th fl transfr rm SE corner of bld. adj to Col. No. 30 | Excess concrete around perimeter of patch in the 6th floor deck slab is not bonded properly and could loosen and fall. Remove the excess concrete. | 10 |
| 4 | 5th & 43rd | 5th floor steam room and 43rd floor East MER. | Loose anchor bolts were found on some of the supports for the ladders. Tighten the anchor bolts as soon as possible. | - |
| 5 | 25th | Just west of Column No. 54 | A motorized projection screen is supported from the ceiling main carrying channels. Either remove the screen and repair the ceiling or properly support it from its own hangers | 9 |
| 6 | 46th | Cooling tower framing | 4 cooling tower ladders are not secured at the bases. Provide anchoring system and seal properly to prevent moisture from entering the roof membrane. | - |
| 7 | 48th | West side of cooling tower | Ladder is fitted with a substandard fall protection cage, has loose bolts at the splice and is not secured properly at the base. Replace the existing cage with one that conforms to OSHA standards. Tighten all bolts as necessary and secure the base of the ladder as performed in Item 6 above. | 13 & 15 |
| 8 | 48th | Northeast corner of Penthouse | The hatch on the 48th floor roof opens to the wrong side of the ladder. Replace the existing hatch cover with one that conforms to OSHA standards. | 12 |

| ROUTINE REPAIRS | | | | |
|---|---|---|---|---|
| ITEM | FLOOR | LOCATION | DESCRIPTION | PHOTO |
| 1 | 47th main roof | North side of building in Cooling Tower area | Remove the wire ropes from the steel framing on the roof. Provide adequate support for the temporary scaffolding using the existing tie-back system | 6 |
| 2 | 46th & 47th | North side of building in Cooling Tower area | Clean and paint the exposed steel framing and cooling tower catwalks on the 46th & 47th floors. | 6 |
| 3 | 46th | Cooling Tower area | Seal all cracks in the exterior brick walls of the 46th floor cooling tower area. | 16 |
| 4 | 47th Main Roof | Inside face of parapets | Secure and seal electrical fixtures on the roof parapets. | _ |
| 5 | 47th Main Roof | Throughout Main Roof | Repair roof areas where membrane is worn and or peeling. | 7 |
| 6 | 46th | Set Back parapet (12) locations | Clean the window washing support bracket, paint, and provide a cap over the crevice to prevent moisture and debris from building inside | _ |
| 7 | 5th | South Generator Room | Repair and or replace all missing and broken pipe supports for the fuel lines | 14 |
| 8 | * | Floor framing | Fireproofing has been removed from the steel framing to install utility supports, partition walls or special equipment. Provide fireproof coating where applicable. | _ |

* *This condition was found throughout the floors which were inspected.*

## B. Substation (ConEd)

### 1.Inspection Findings and Conclusions

The structure is in very good condition and there is little deterioration on the structural elements. The columns and the bracing are in good condition and there is no signs of settlement to suggest that there is a problem with the foundations. However, the large concrete trough beams at the roof level are exhibiting fine transverse cracks throughout and efflorescence has begun to form at these crack locations (see Photo No. 17 on page 34.)

The beams support the roof of the substation and what is now the 3rd floor (Main Lobby Level) of 7 WTC. These trough beams are capped with precast panels with a layer of concrete on top of them forming the roof level. At some point in time moisture infiltrated the troughs and started leaching trough the cracks. Efflorescence is also present on the underside of the cantilevered roof section which overhangs the transformers. This condition is localized to areas which were patched and are adjacent to column nos. 46 and 55. However, the concrete is in sound condition and there are no signs of dampness to suggest that the leaching process is still active. Therefore, the existence of the efflorescence stains does not warrant any action at this time.

### 2. Recommendations

**No action is required at this time.**

Photo No. 17: Efflorescence on underside of concrete trough beams inside the ConEd Substation at the roof level.

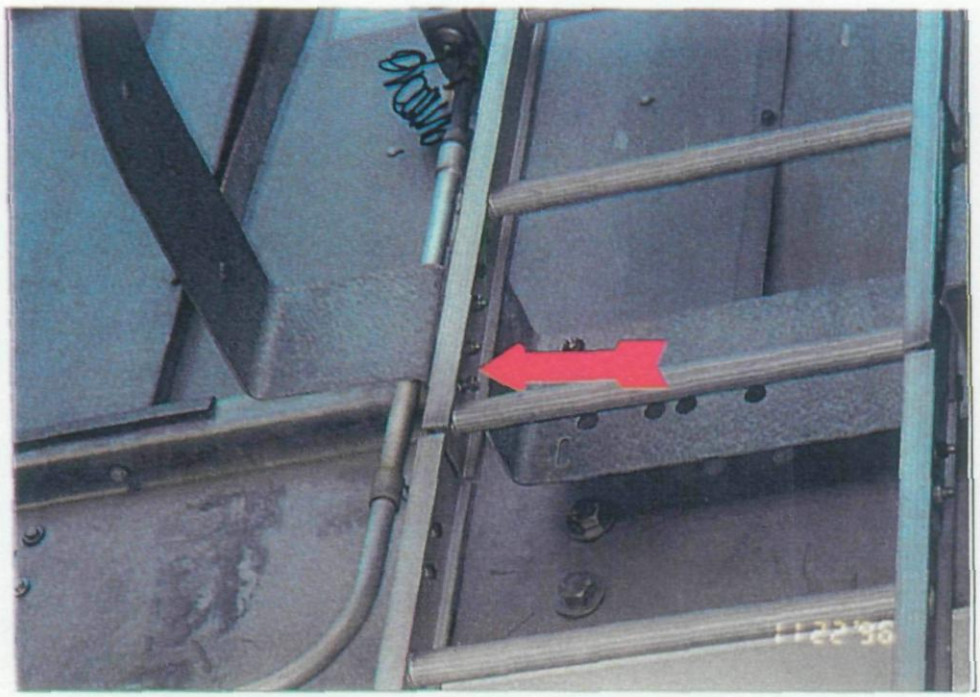


Photo No. 13: West ladder of Cooling Tower on the 48th floor, note loose bolts at rail splice and fall protection cage connection.

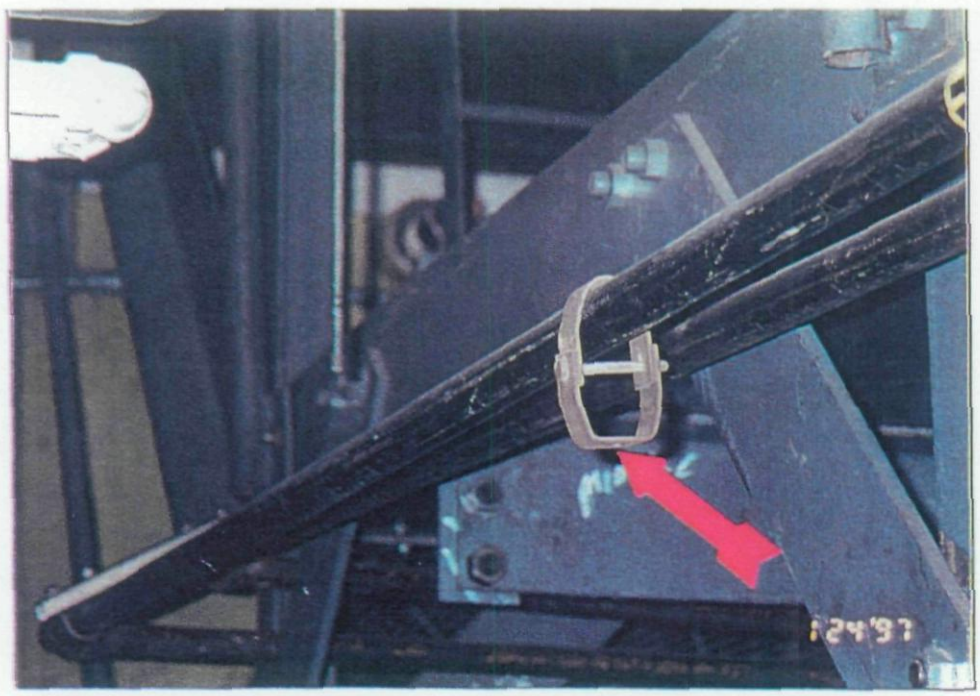
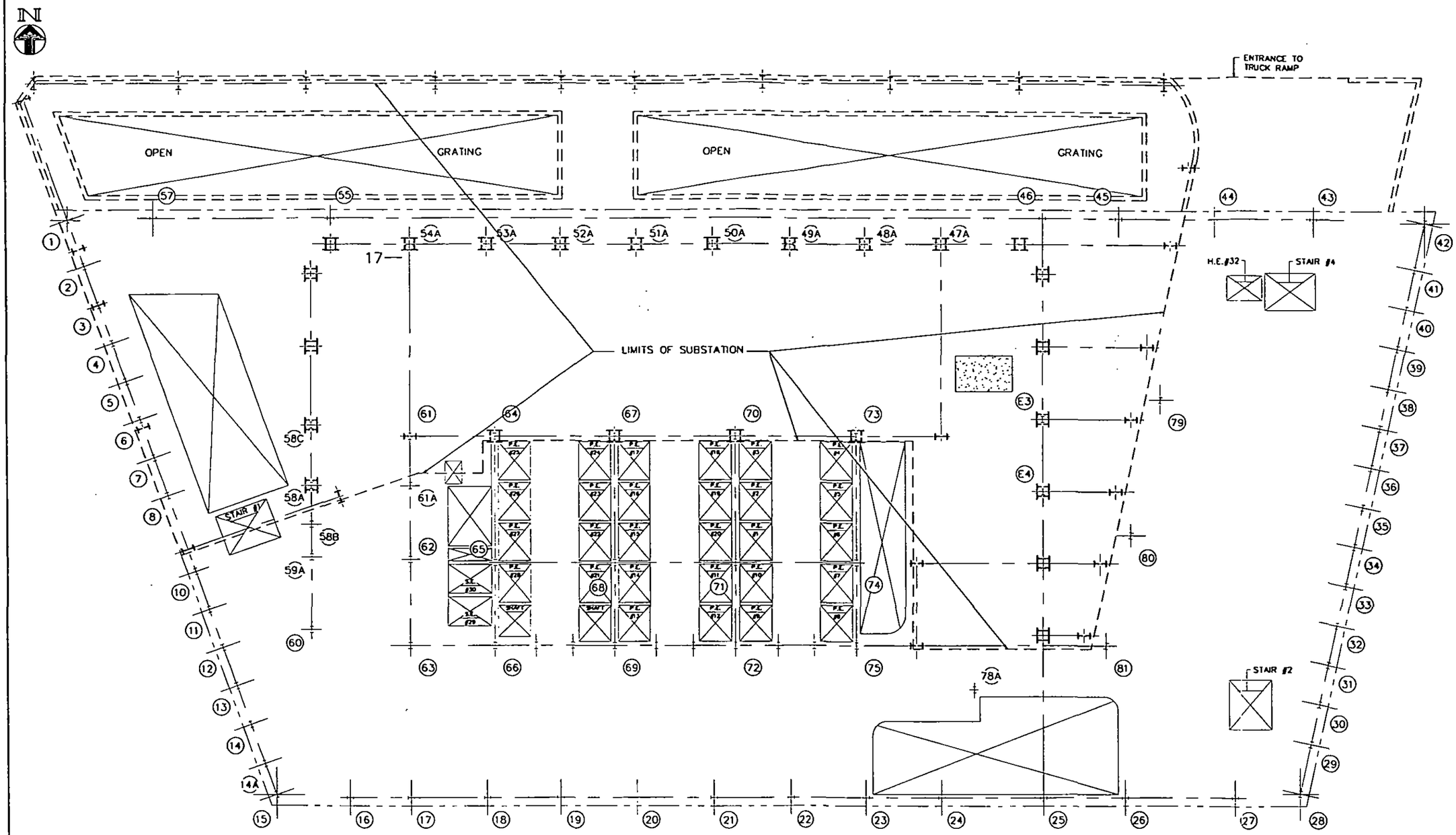


Photo No. 14: Missing and broken pipe supports on the fuel line in the 5th floor generator room on the south side of the building.

## VI. LAYOUT PLANS OF INSPECTED FLOORS

| Dwg. No. | Title |
|---|---|
| S-1 | Substation Plan |
| S-2 | 3rd and 4th Floor Plans |
| S-3 | 5th Floor Plan |
| S-4 | 6th Floor Plan |
| S-5 | 7th Floor Plan |
| S-6 | 10th Floor Plan |
| S-7 | 18th Floor Plan |
| S-8 | 23rd Floor Plan |
| S-9 | 25th Floor Plan |
| S-10 | 43rd Floor Plan |
| S-11 | 47th Floor Plan |
| S-12 | Roof Plan |
| S-13 | North and West Elevations |
| S-14 | South and East Elevations |
| S-15 | Core Elevations |
| S-16 | Typical Section Thru Floor (Fig. 1) |
| S-17 | Section Thru North Fascia Cantilever (Fig. 2) |
| S-18 | Detail of Typical Framing and Upper Wind Bracing (Fig. 3) |
| S-19 | Typical Lightweight Ceiling Construction (Fig. 4) |




## SUBSTATION PLAN
SCALE: N.T.S.

(8) — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

## LEGEND

- (5) .....CEILING AND OR FRAMING ACCESS LOCATION.
- 3 .....PHOTO NO. LOCATION
- ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
- CONCEALED SPLINE CEILING (LIGHTWEIGHT)
- CONCRETE ENCASED FRAMING (NO CEILING)
- GB GYPSUM BOARD CEILING (LIGHTWEIGHT)
- (H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

- (2) SAFETY
- (2) ROUTINE
- (1) PRIORITY

Sheet – Of –

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

SUBSTATION PLAN EL.

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by Drawn by Checked by

Date –

Scale AS SHOWN

Contract Number

Drawing Number S-1

FILE NO. 7WTCS16

N

LIMITS OF SUBSTATION

ENTRANCE TO TRUCK RAMP

3

CON EDISON SUBSTATION

LIMITS OF SUBSTATION

OPEN TO SUBSTATION TRANSFORMER ROOMS

SALOMON CONFERENCE CENTER
(ACOUSTIC TILE)
1/4" STEEL PLATE SHELL ON WALLS, FLOORS & CEILINGS
WINDOWS REMAIN ON NORTH WALL

H.E. #32

STAIR #4

AT 4TH FLOOR

KITCHEN & CAFETERIA AT 4TH FLOOR ONLY

EDGE OF SLAB AT 4TH FLOOR ONLY

DINING ROOM AT 4TH FLOOR ONLY

LIMITS OF SUBSTATION

ESCALATOR

STAIR #1

MECHANICAL ROOM

STAIR #2

ESCALATOR

MAIN LOBBY (3RD FLOOR)

OPEN TO LOBBY BELOW

(H) ACCESS FOR CEILING ABOVE LOADING DOCK IN WALL OF 2nd FLOOR STEAM ROOM

LOADING DOCK AREA BELOW MAIN LOBBY

*ACCESS TO LOADING DOCK CEILING IS THROUGH HATCH IN WALL OF 2ND FLOOR MER WOOD PLANKING ON CEILING

PEDESTRIAN BRIDGE ACCESS TO 3rd FLOOR LOOBY

TIMBER PLANKING ON LOADING DOCK CEILING

PLAZA EXTENSION – ACCESS TO 3rd FLOOR LOOBY

## 3RD & 4TH FLOOR PLANS

SCALE: 3/32"=1'-0"

(8) — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

## LEGEND

(5) .....CEILING AND OR FRAMING ACCESS LOCATION.

3 .....PHOTO NO. LOCATION

..... ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

..... CONCEALED SPLINE CEILING (LIGHTWEIGHT)

..... CONCRETE ENCASED FRAMING (NO CEILING)

GB ..... GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H) .....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

(2) SAFETY

(2) ROUTINE

(1) PRIORITY

Sheet – Of –

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

3RD & 4TH FLOOR PLANS

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by | Drawn by | Checked by

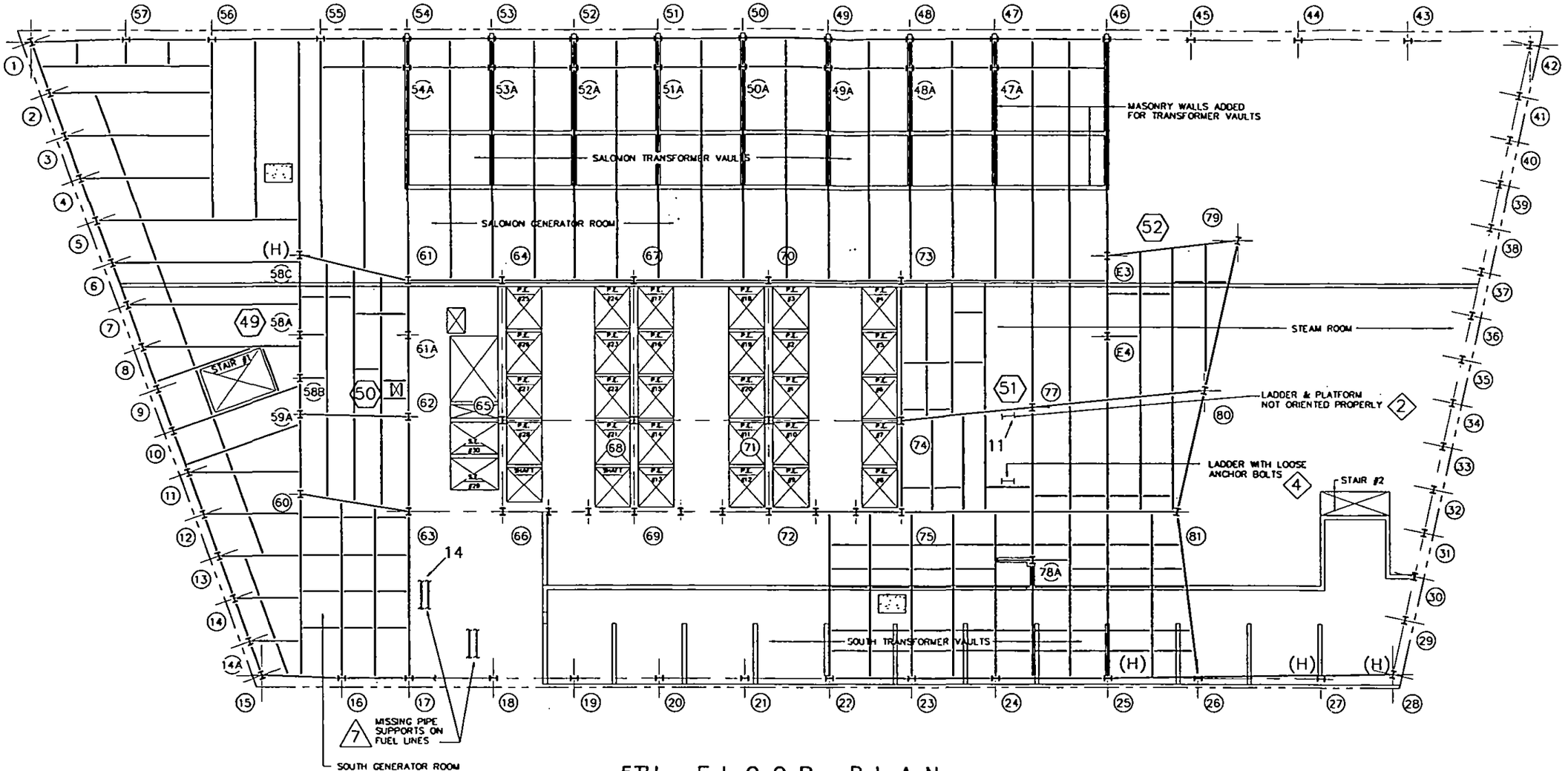
Date: 2

Scale: AS SHOWN

Contract Number

Drawing Number: S-2

FILE NO. 7WTCS14




# 5TH FLOOR PLAN

SCALE: 3/32"=1'-0"

NOTE: PARTIAL FRAMING SHOWN FOR CLARITY

## LEGEND

- (5) .....CEILING AND OR FRAMING ACCESS LOCATION.
- 3 .....PHOTO NO. LOCATION
- ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
- CONCEALED SPLINE CEILING (LIGHTWEIGHT)
- CONCRETE ENCASED FRAMING (NO CEILING)
- GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)
- (H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

- (2) SAFETY
- 2 ROUTINE
- (1) PRIORITY

8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

FILE NO 7WTCS13

Sheet: – of –

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

5TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

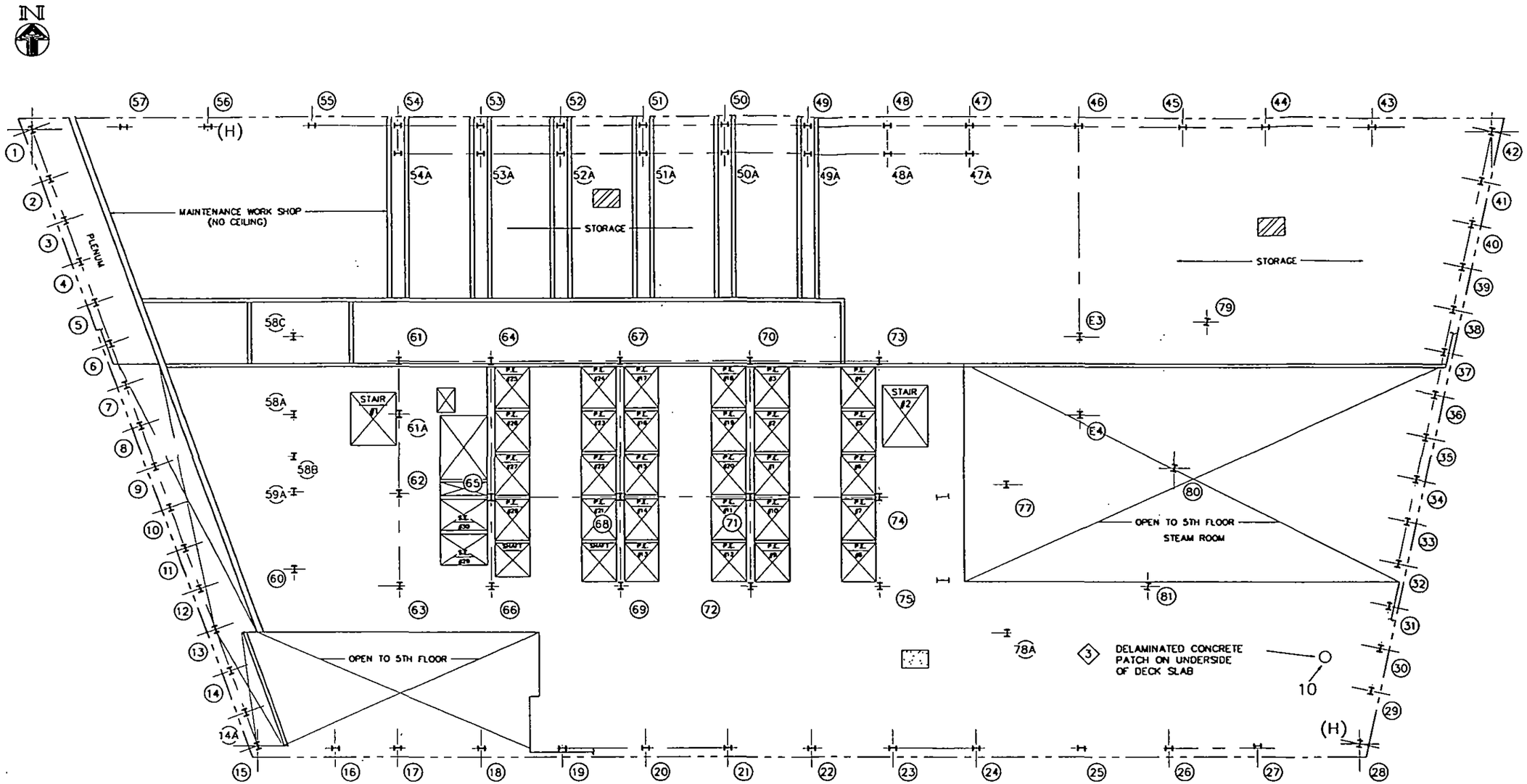
Designed by | Drawn by | Checked by

Date: –

Scale: AS SHOWN

Contract Number

Drawing Number: S-3




# 6TH FLOOR PLAN

SCALE: 3/32"=1'-0"

## LEGEND

- (5) .....CEILING AND OR FRAMING ACCESS LOCATION.
- 3 .....PHOTO NO. LOCATION
- ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
- CONCEALED SPLINE CEILING (LIGHTWEIGHT)
- CONCRETE ENCASED FRAMING (NO CEILING)
- GB GYPSUM BOARD CEILING (LIGHTWEIGHT)
- (H) .....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

- (2) SAFETY
- (2) ROUTINE
- (1) PRIORITY

(8) — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

Sheet: - Of -

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

6TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by Drawn by Checked by

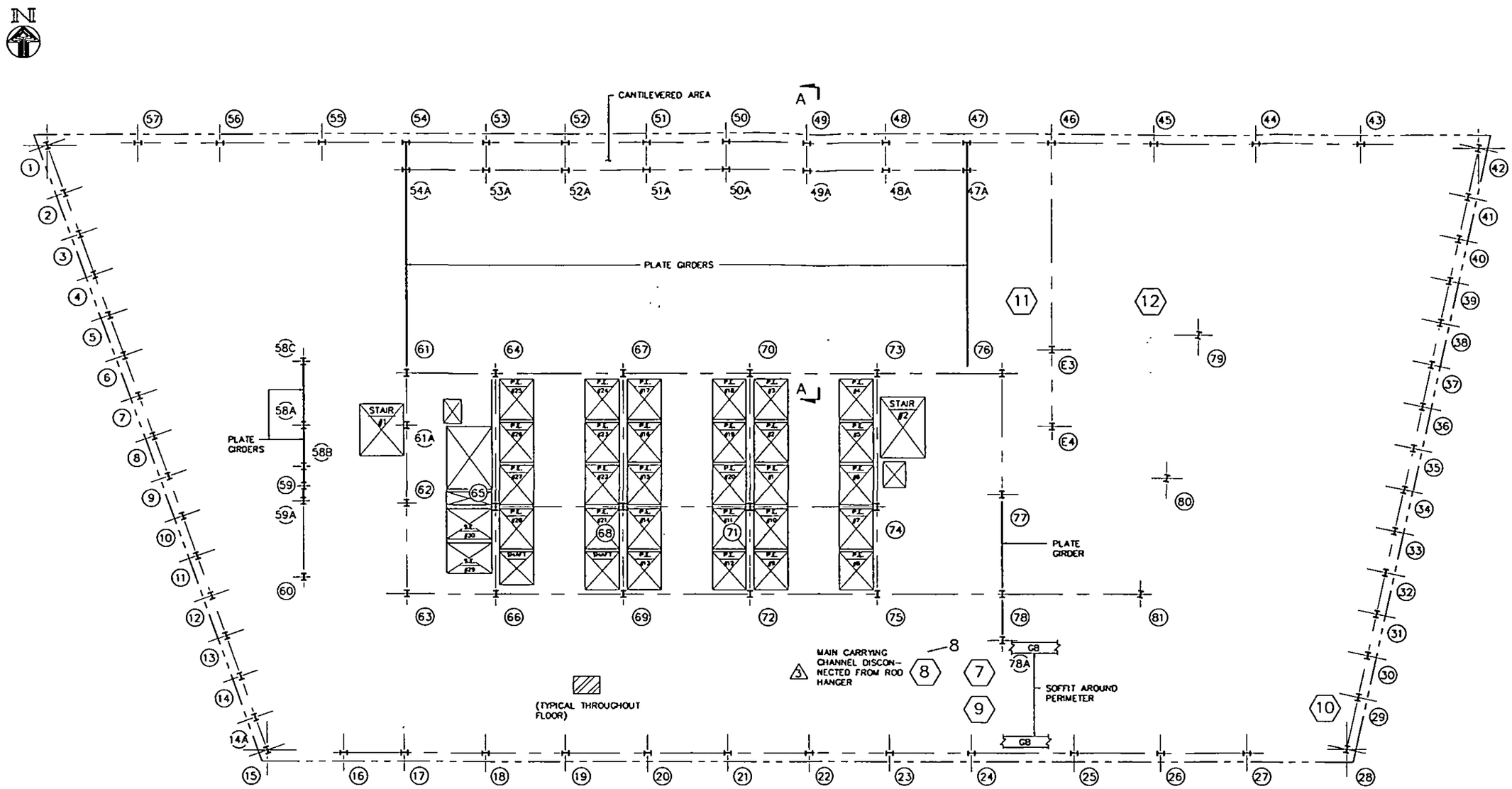
Date: -"

Scale: AS SHOWN

Contract Number

Drawing Number: S-4

FILE NO 7WTCS12




# 7TH FLOOR PLAN

SCALE: 3/32"=1'-0"

NOTE:

FOR SECTION "A" SEE DRAWING S-17 OF THIS SECTION.

8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

## LEGEND

5 .....CEILING AND OR FRAMING ACCESS LOCATION.

3 .....PHOTO NO. LOCATION

.....ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

.....CONCEALED SPLINE CEILING (LIGHTWEIGHT)

.....CONCRETE ENCASED FRAMING (NO CEILING)

GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

2 SAFETY

2 ROUTINE

1 PRIORITY

FILE NO. 7WTCS11

Sheet: - of -

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

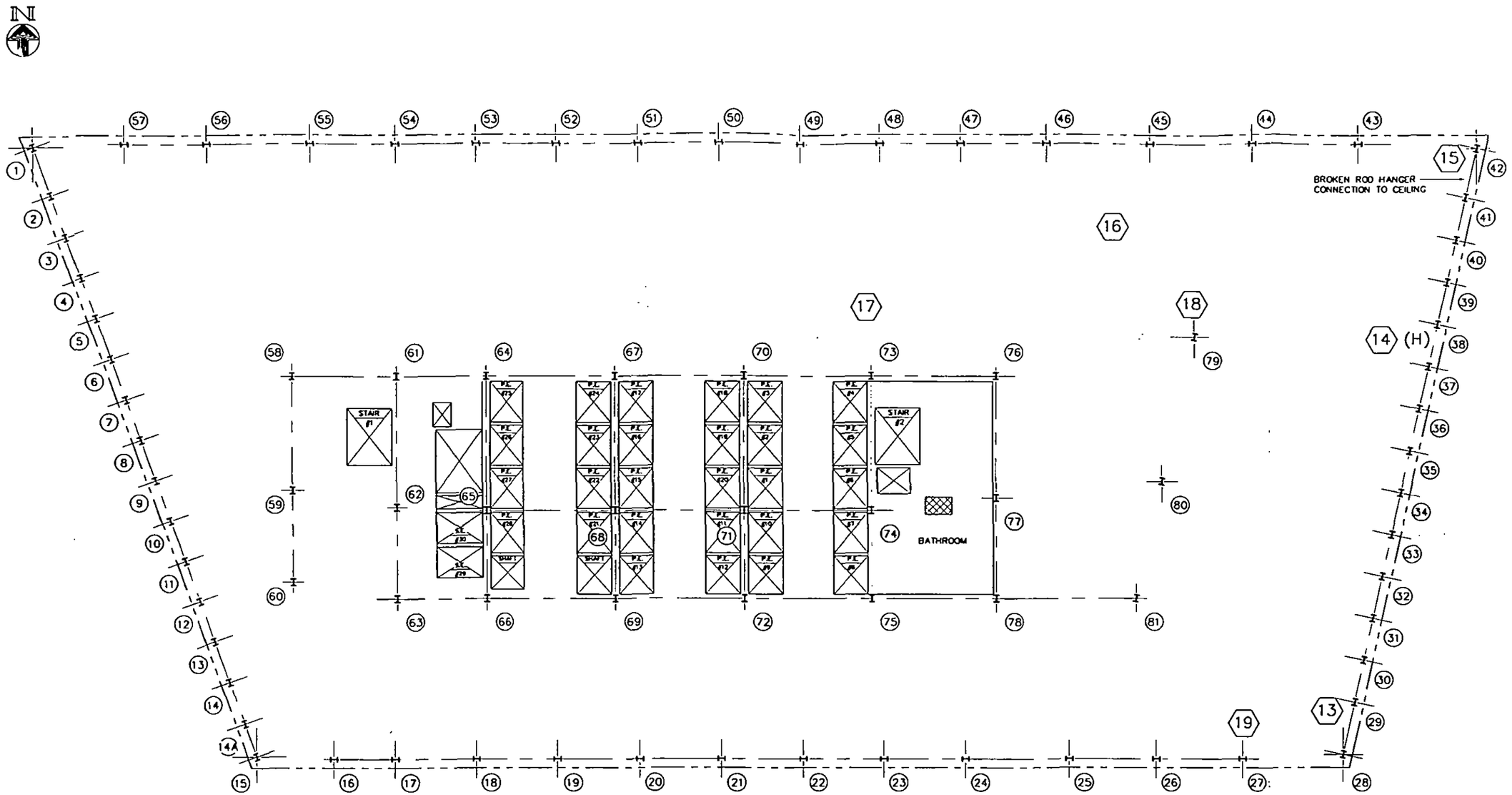
7TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by | Drawn by | Checked by

Date | Scale: AS SHOWN

Contract Number | Drawing Number: S-5




## 10TH FLOOR PLAN
SCALE: 3/32"=1'-0"

(8) — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

## LEGEND

(5) .....CEILING AND OR FRAMING ACCESS LOCATION

3 .....PHOTO NO. LOCATION

.....ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

.....CONCEALED SPLINE CEILING (LIGHTWEIGHT)

.....CONCRETE ENCASED FRAMING (NO CEILING)

GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H) .....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

(2) SAFETY

(2) ROUTINE

(1) PRIORITY

Sheet: – of –

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

10TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by Drawn by Checked by

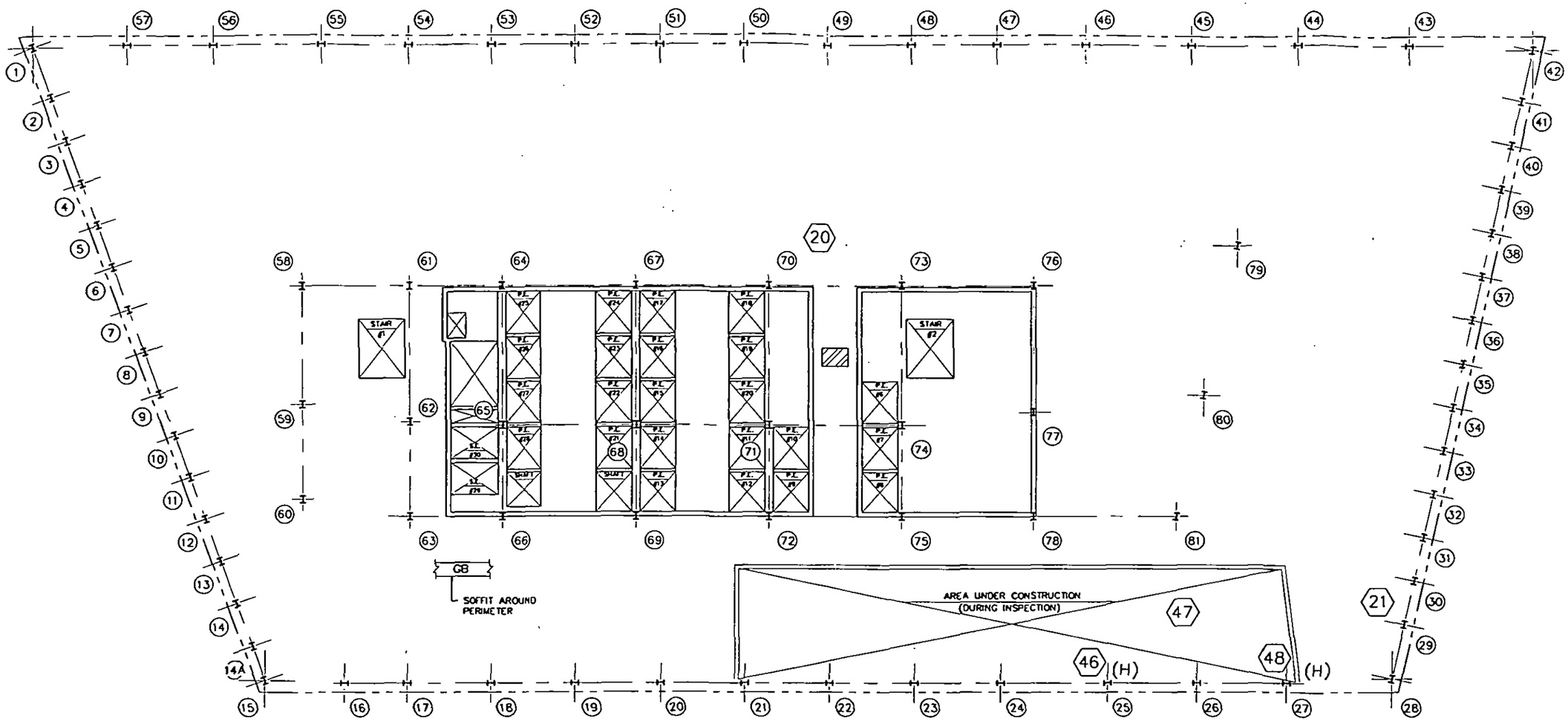
Date –

Scale AS SHOWN

Contract Number

Drawing Number S–6

FILE NO. 7WTCS10




# 18TH FLOOR PLAN

SCALE: 3/32"=1'-0"

## LEGEND

⟨5⟩ .....CEILING AND OR FRAMING ACCESS LOCATION.

3 .....PHOTO NO. LOCATION

ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

CONCEALED SPLINE CEILING .....(LIGHTWEIGHT)

CONCRETE ENCASED FRAMING .....(NO CEILING)

GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

⟨2⟩ SAFETY

⟨2⟩ ROUTINE

(1) PRIORITY

⟨8⟩ — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

FILE NO. 7WTCS9

Sheet – of –

THE PORT AUTHORITY OF NY & NJ

No Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

18TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

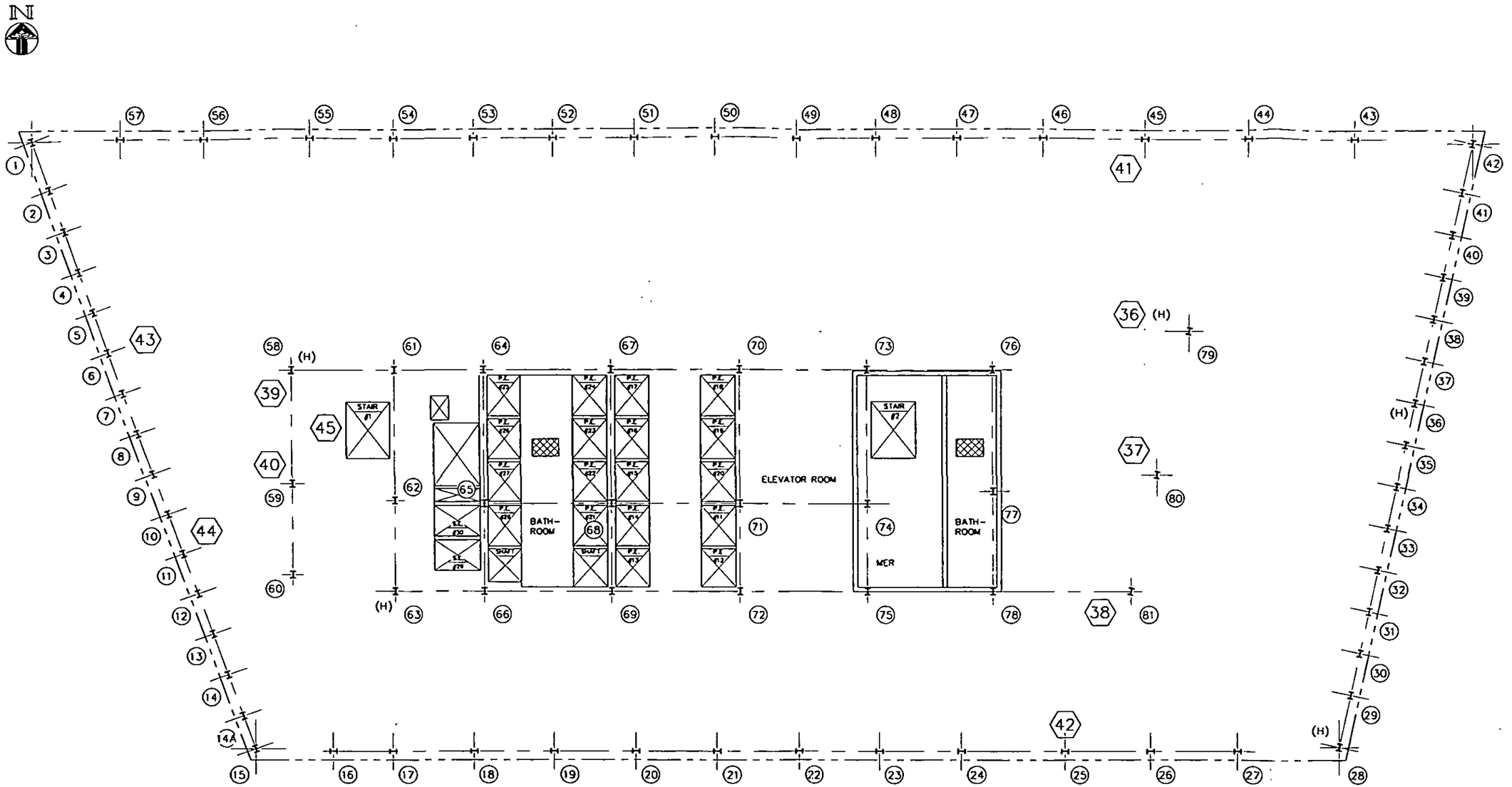
Designed by Drawn by Checked by

Date –

Scale AS SHOWN

Contract Number

Drawing Number S-7




## 23RD FLOOR PLAN

SCALE: 3/32"=1'-0"

NO CEILINGS
FRAMING EXPOSED
COMPLETELY UNOCCUPIED

⚠8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

### LEGEND

⟨5⟩.....CEILING AND OR FRAMING ACCESS LOCATION.
3.....PHOTO NO. LOCATION
.....ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
.....CONCEALED SPLINE CEILING (LIGHTWEIGHT)
.....CONCRETE ENCASED FRAMING (NO CEILING)
GB.....GYPSUM BOARD CEILING (LIGHTWEIGHT)
(H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)
◇2 SAFETY
△2 ROUTINE
(1) PRIORITY

FILE NO. 7WTCS8

Sheet - Of -

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

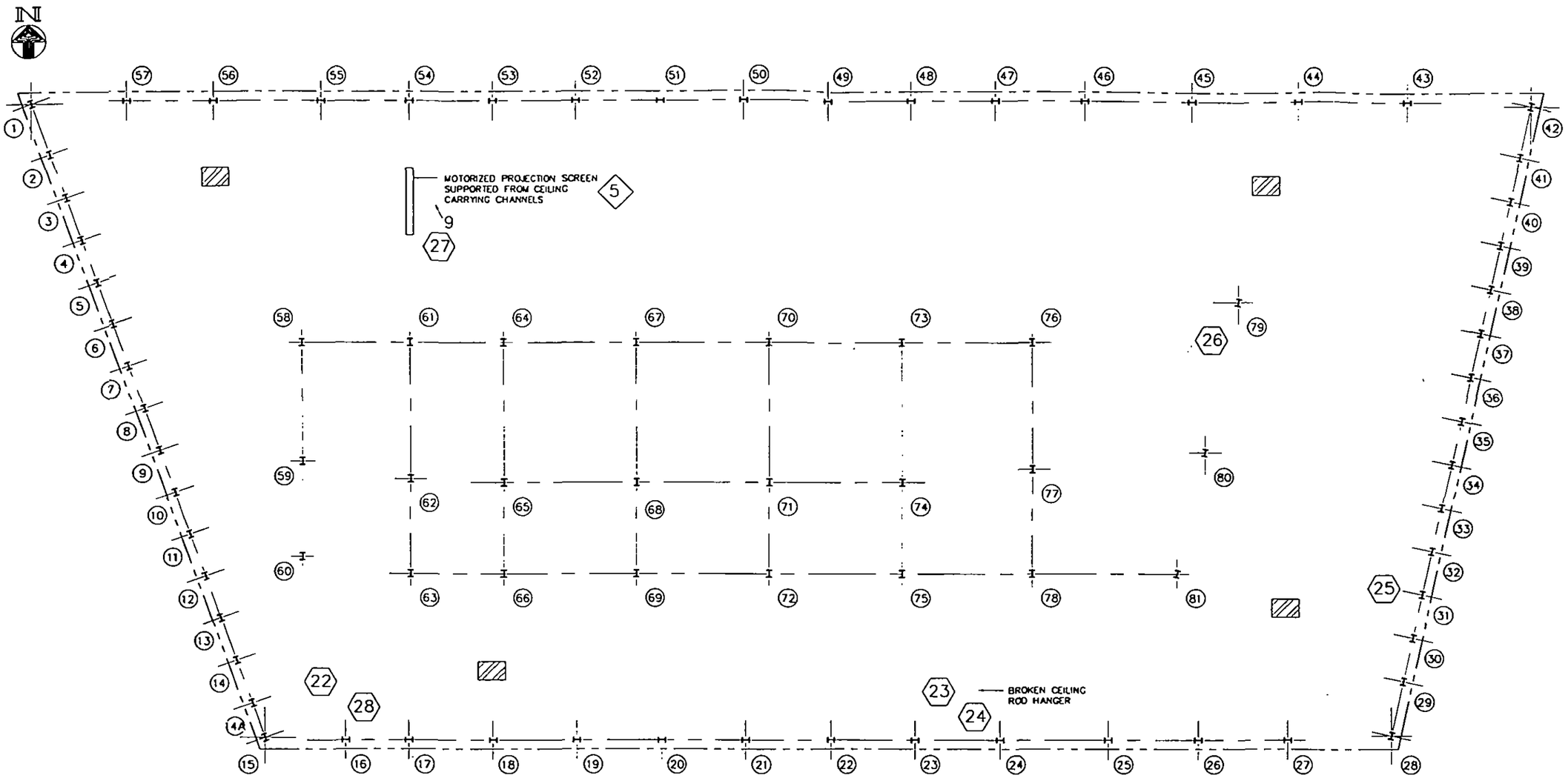
23RD FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by Drawn by Checked by

Date Scale
AS SHOWN

Contract Number Drawing Number
S-8




## 25TH FLOOR PLAN

SCALE: 3/32"=1'-0"

8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

### LEGEND

5 .....CEILING AND OR FRAMING ACCESS LOCATION.

3 .....PHOTO NO. LOCATION

.....ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

.....CONCEALED SPLINE CEILING (LIGHTWEIGHT)

.....CONCRETE ENCASED FRAMING (NO CEILING)

GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

2 SAFETY

2 ROUTINE

1 PRIORITY

Sheet: - of -

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

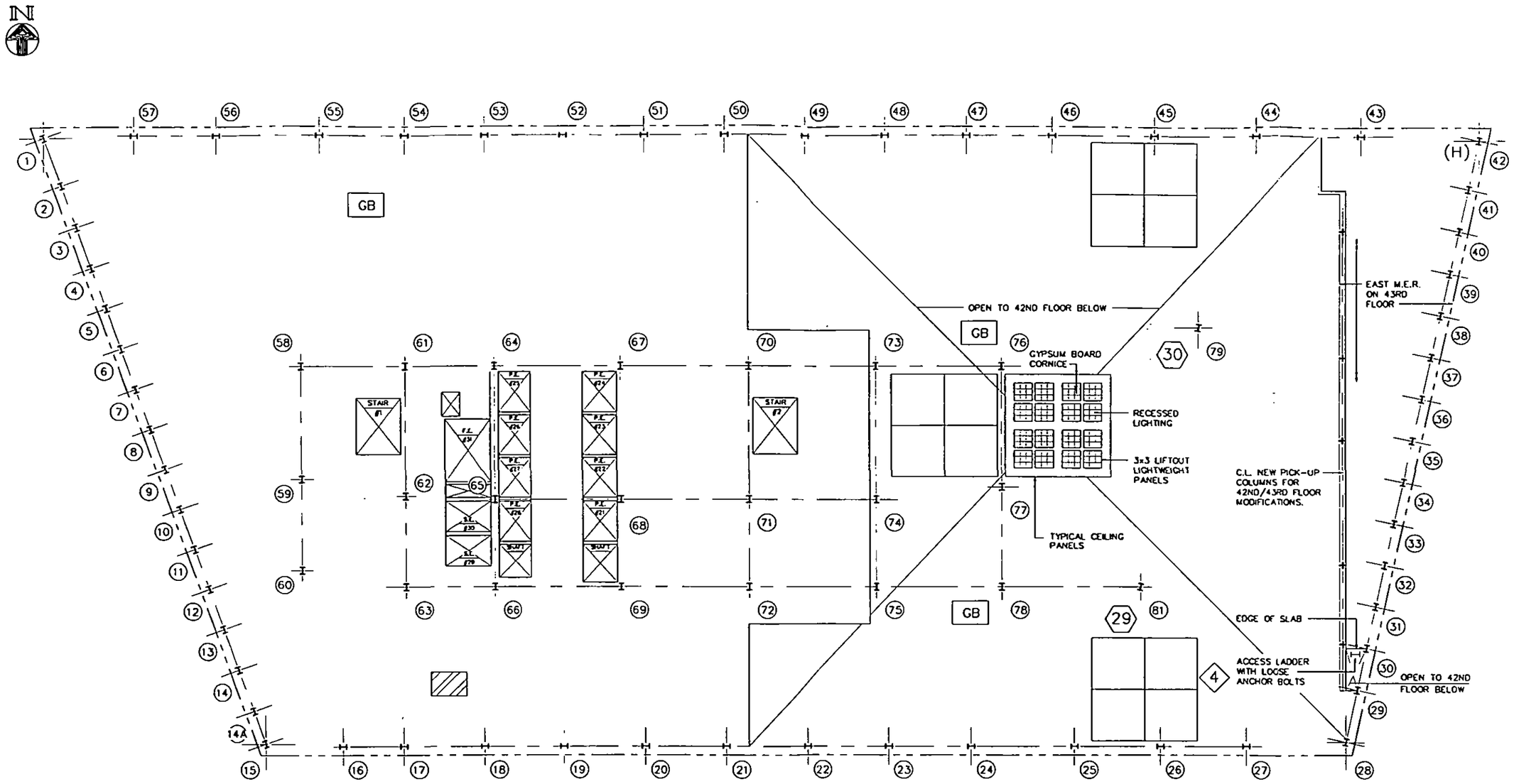
7 WTC BASELINE CONDITION SURVEY

25TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

| Designed by | Drawn by | Checked by |
|---|---|---|
| Date: - | Scale: AS SHOWN | |
| Contract Number | Drawing Number: S-9 | |

FILE NO. 7WTCS1.DWG




## 43RD FLOOR PLAN

SCALE: 3/32"=1'-0"

8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

### LEGEND

- (5) .....CEILING AND OR FRAMING ACCESS LOCATION
- 3 .....PHOTO NO. LOCATION
- ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
- CONCEALED SPLINE CEILING (LIGHTWEIGHT)
- CONCRETE ENCASED FRAMING (NO CEILING)
- GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)
- (H).....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

- (2) SAFETY
- (2) ROUTINE
- (1) PRIORITY

Sheet: – Of –

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

43RD FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PAth and may not be used without its written consent

Designed by | Drawn by | Checked by

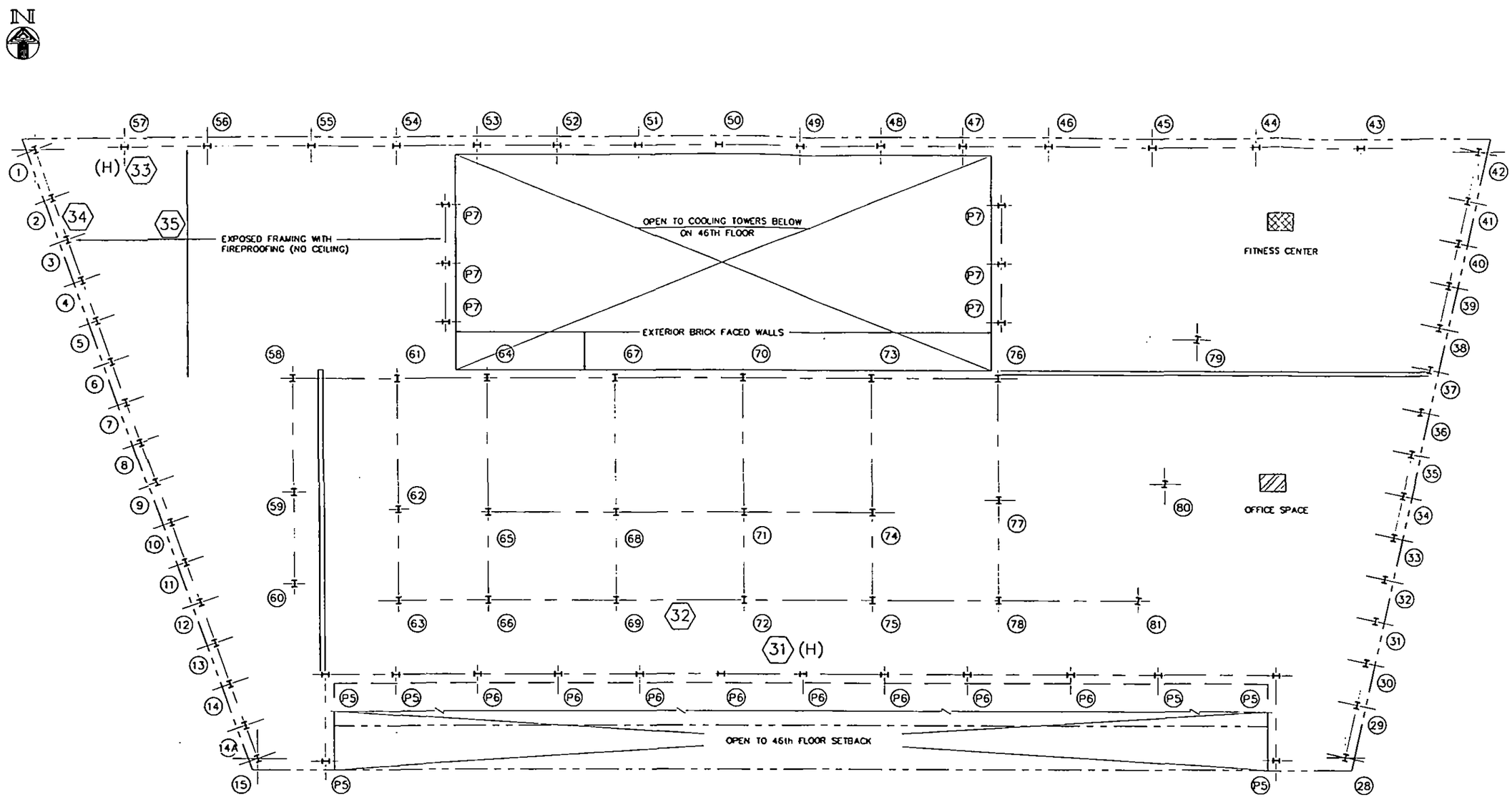
Date –

Scale AS SHOWN

Contract Number

Drawing Number S-10

FILE NO. 7WTCS7




## 47TH FLOOR PLAN

SCALE: 3/32"=1'-0"

8 — FIREPROOFING NEEDS TO BE REPLACED THROUGHOUT THE FRAMING WHERE IT HAD BEEN REMOVED FOR THE INSTALLATION OF UTILITIES AND PARTITION WALLS.

### LEGEND

- 5 ..... CEILING AND OR FRAMING ACCESS LOCATION.
- 3 ..... PHOTO NO. LOCATION
- ..... ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)
- ..... CONCEALED SPLINE CEILING (LIGHTWEIGHT)
- ..... CONCRETE ENCASED FRAMING (NO CEILING)
- GB ..... GYPSUM BOARD CEILING (LIGHTWEIGHT)
- (H) ..... HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

- 2 SAFETY
- 2 ROUTINE
- 1 PRIORITY

FILE NO. 7WTCS6

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

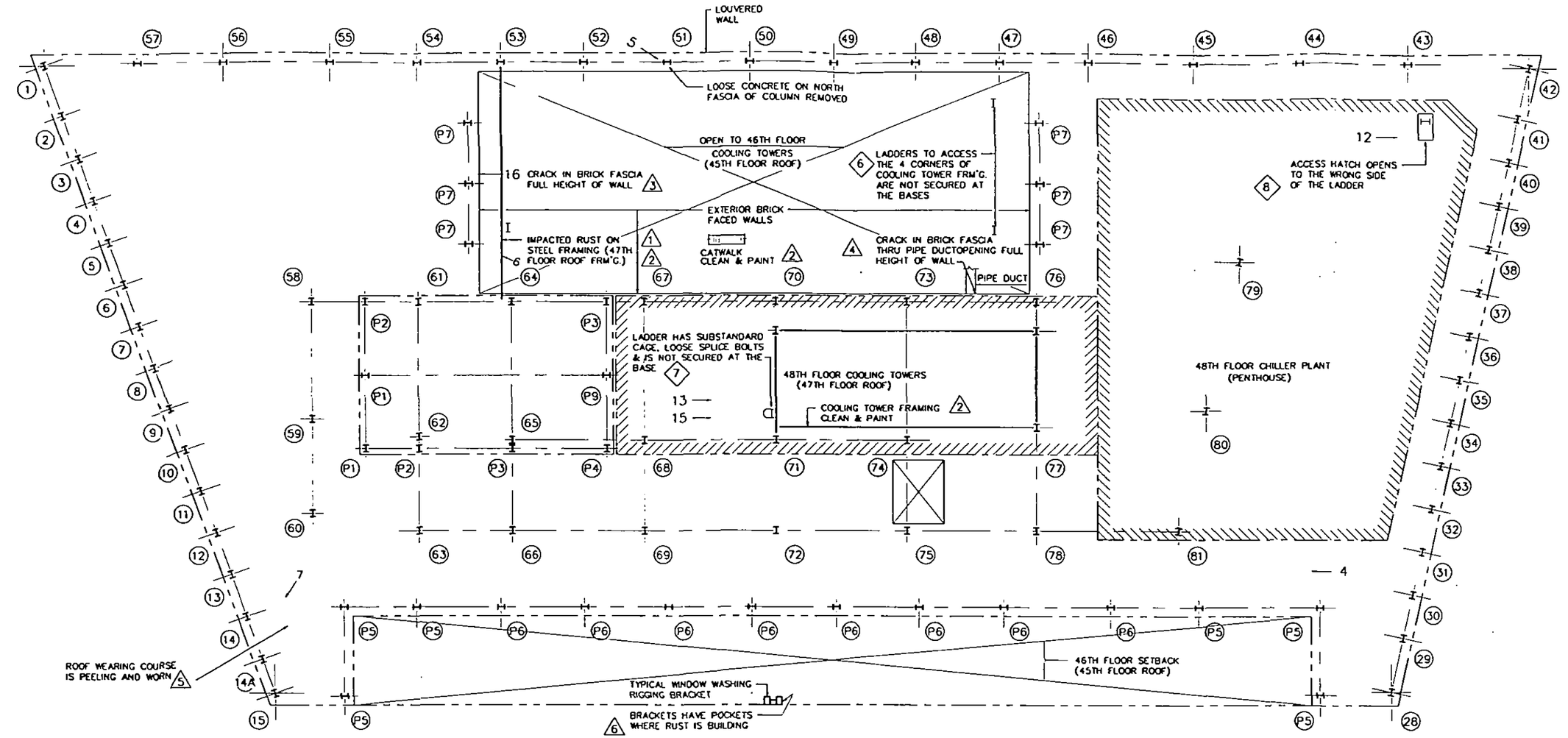
7 WTC BASELINE CONDITION SURVEY

47TH FLOOR PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PAth and may not be used without its written consent.

Designed by | Drawn by | Checked by

Date: -
Scale: AS SHOWN
Contract Number
Drawing Number: S-11




## ROOF PLAN

SCALE: 3/32"=1'-0"

4 SECURE AND SEAL ELECTRICAL FIXTURES ON THE ROOF PARAPETS

### LEGEND

5 .....CEILING AND OR FRAMING ACCESS LOCATION

3 .....PHOTO NO. LOCATION

.....ACOUSTICAL TILE (LIGHT-WEIGHT DROP CEILING)

.....CONCEALED SPLINE CEILING (LIGHTWEIGHT)

.....CONCRETE ENCASED FRAMING (NO CEILING)

GB .....GYPSUM BOARD CEILING (LIGHTWEIGHT)

(H) .....HANDS ON INSPECTION

CONDITIONS W/ITEM NOS (SEE SECTION V)

2 SAFETY

2 ROUTINE

1 PRIORITY

THE PORT AUTHORITY OF NY & NJ

| No | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

ROOF PLAN

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by | Drawn by | Checked by

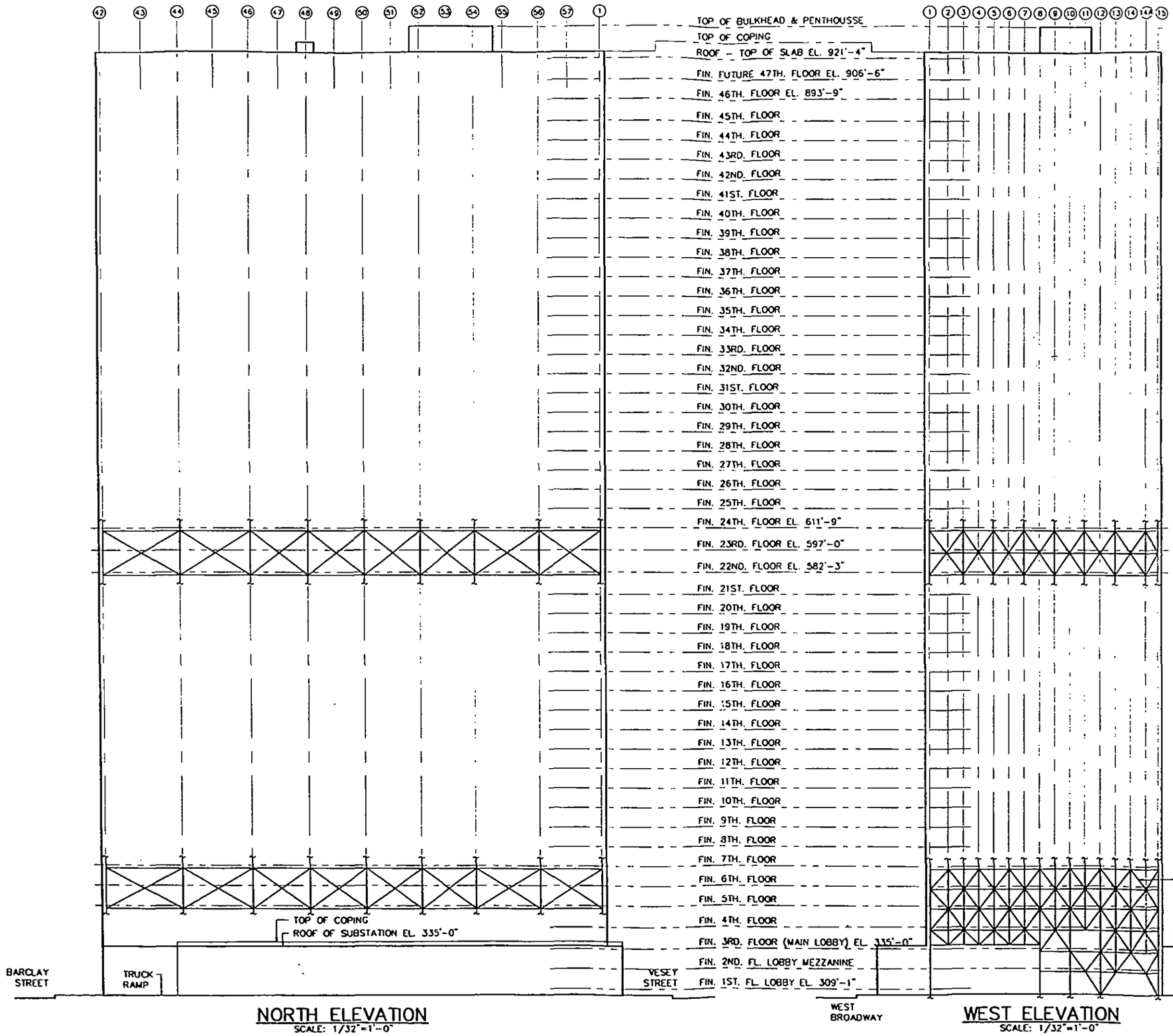
Date –

Scale AS SHOWN

Contract Number

Drawing Number S-12

FILE NO. 7WTCS2




NORTH ELEVATION
SCALE: 1/32"=1'-0"

WEST ELEVATION
SCALE: 1/32"=1'-0"

FILE NO. 7WTCS4

Sheet - 0 -

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

NORTH & WEST ELEVATION

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

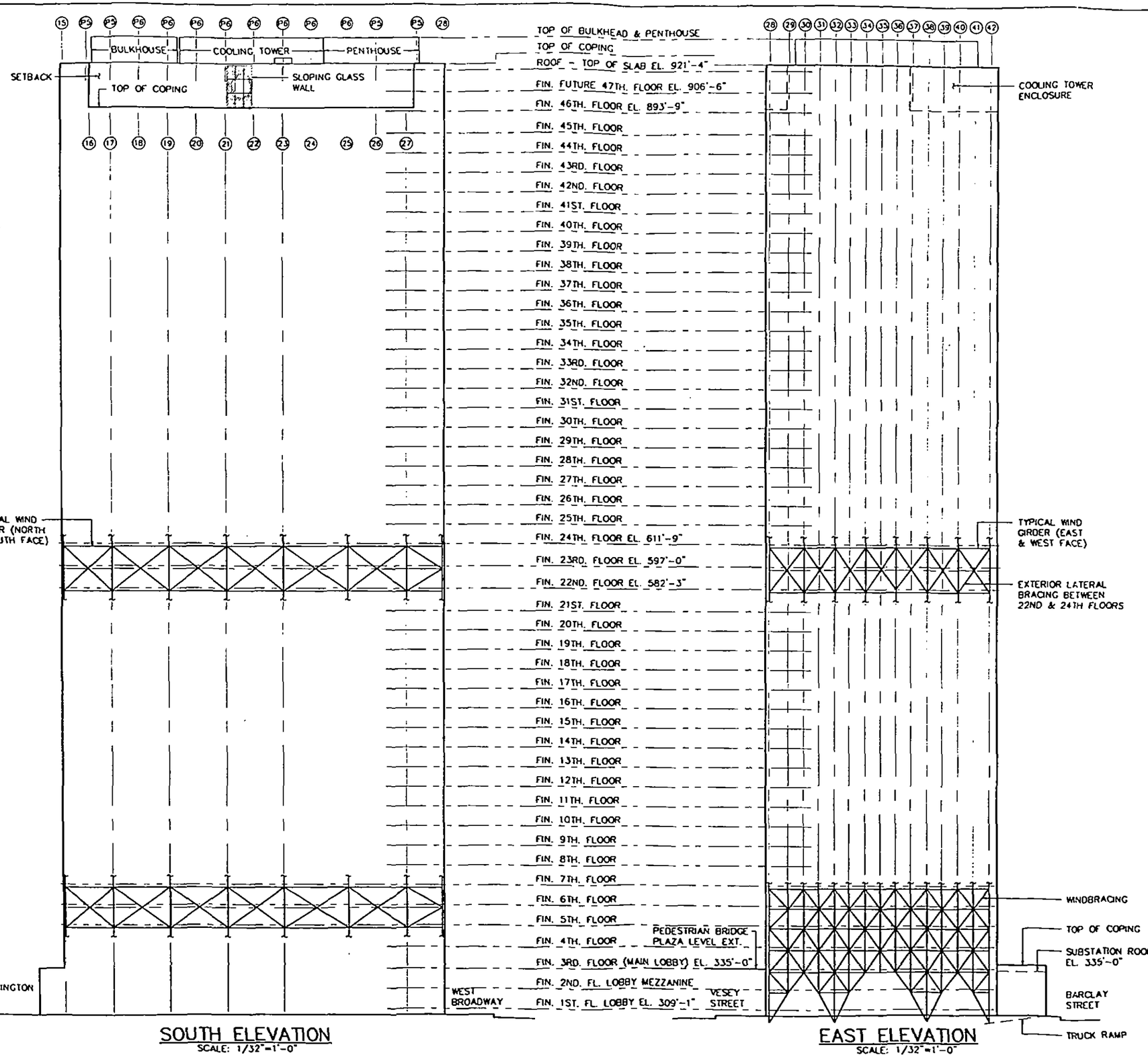
Designed by Drawn by Checked by

Date
-

Scale
AS SHOWN

Contract Number

Drawing Number
S-13




SOUTH ELEVATION
SCALE: 1/32"=1'-0"

EAST ELEVATION
SCALE: 1/32"=1'-0"

THE PORT AUTHORITY OF NY & NJ

No. Date Revision Approved

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

SOUTH & EAST ELEVATION

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

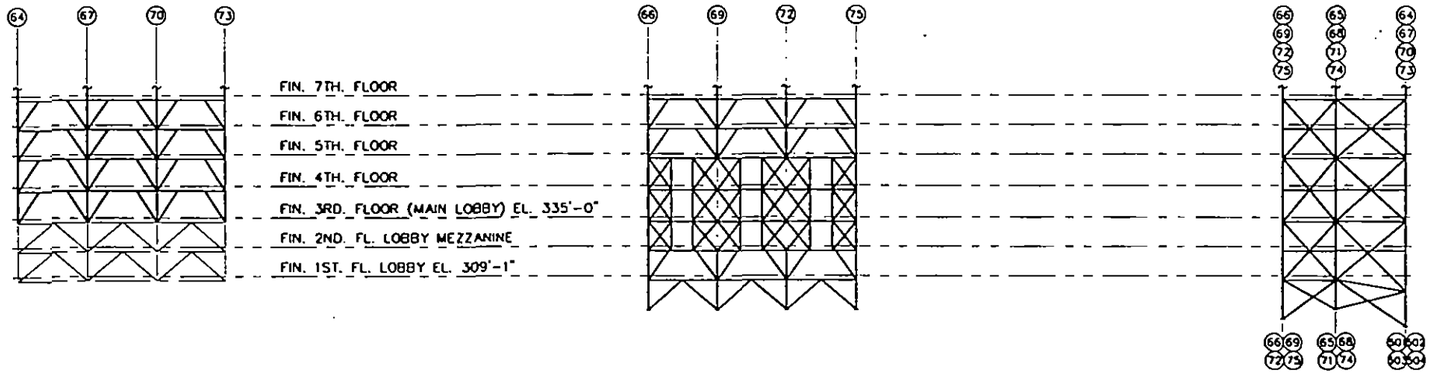
Designed by Drawn by Checked by

Date —

Scale AS SHOWN

Contract Number

Drawing Number S-14




NORTH ELEVATION
SCALE: 1/32"=1'-0"

SOUTH ELEVATION
SCALE: 1/32"=1'-0"

EAST & WEST ELEVATION
SCALE: 1/32"=1'-0"

# C O R E  E L E V A T I O N S

Sheet – of –

THE PORT AUTHORITY OF NY & NJ

| No. | Date | Revision | Approved |
|---|---|---|---|

Engineering Department
Design Divisions

7 World Trade Center

Title

7 WTC BASELINE CONDITION SURVEY

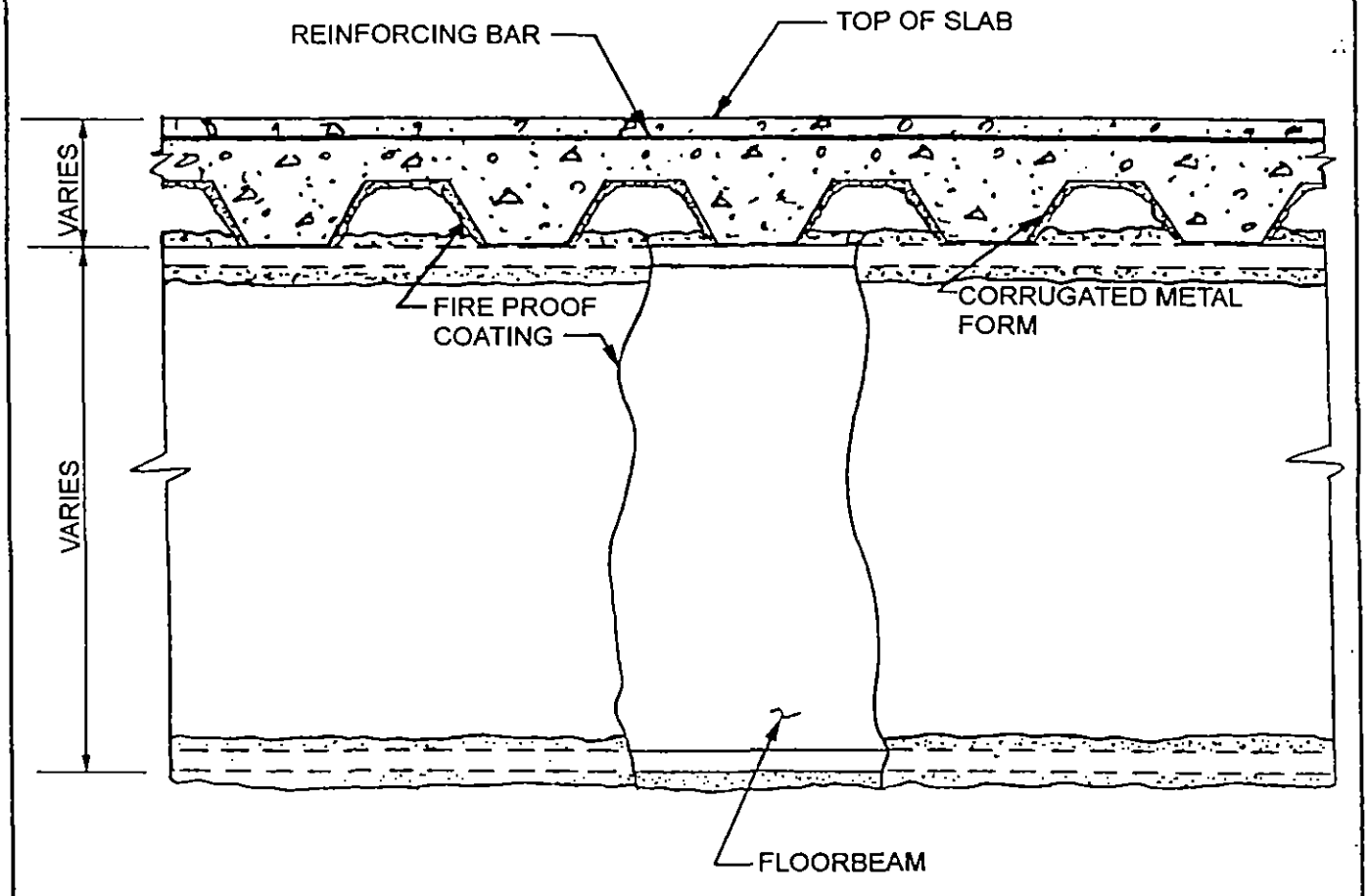
CORE ELEVATIONS

This drawing subject to conditions in contract. All inventions, ideas, designs and methods herein are reserved to PATH and may not be used without its written consent.

Designed by | Drawn by | Checked by

Date: –
Scale: AS SHOWN
Contract Number
Drawing Number: S-15

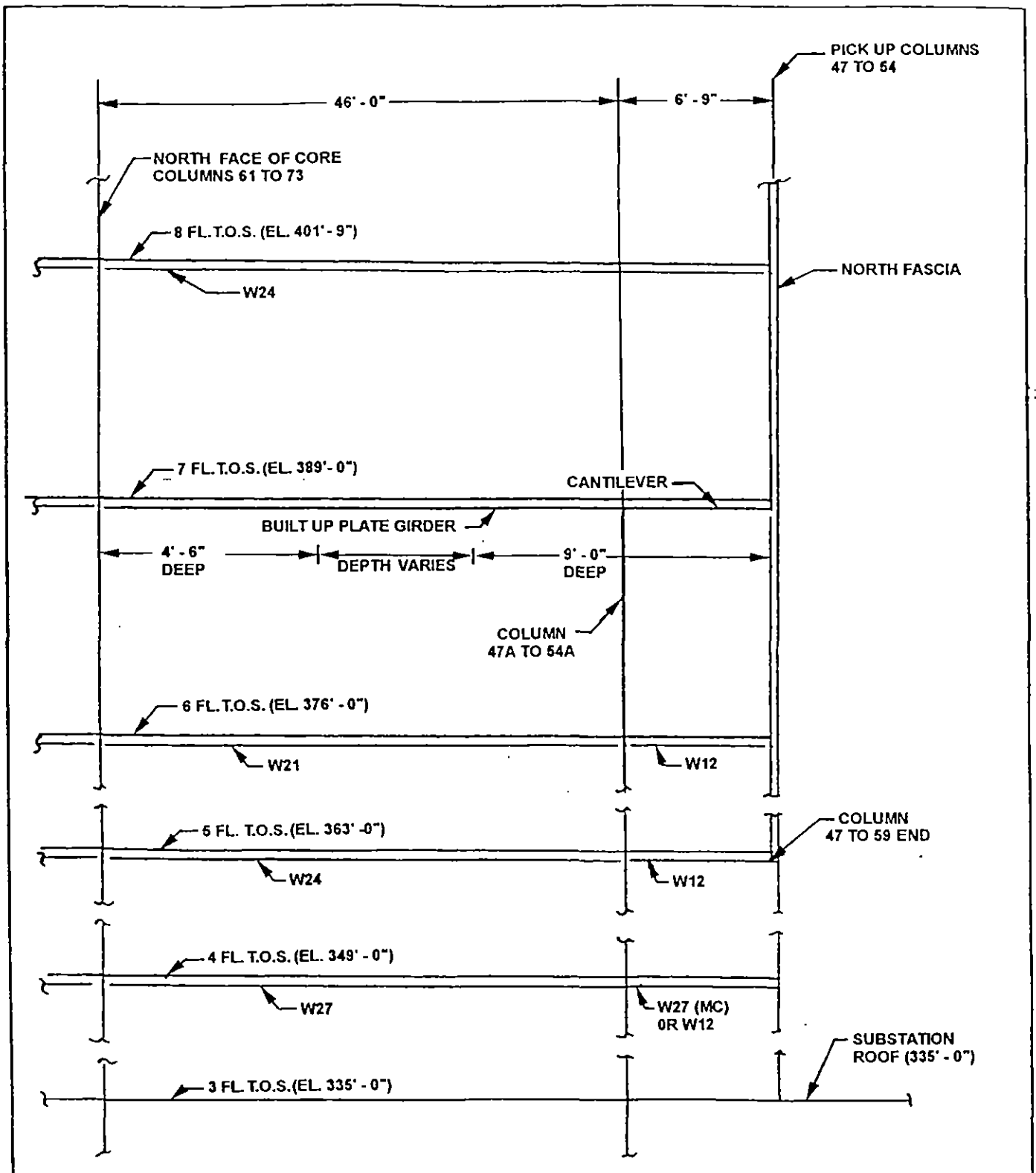
FILE NO. 7WTCS13




# TYPICAL SECTION
# THRU FLOOR
N.T.S.

FIG. 1

DRAWING S-16

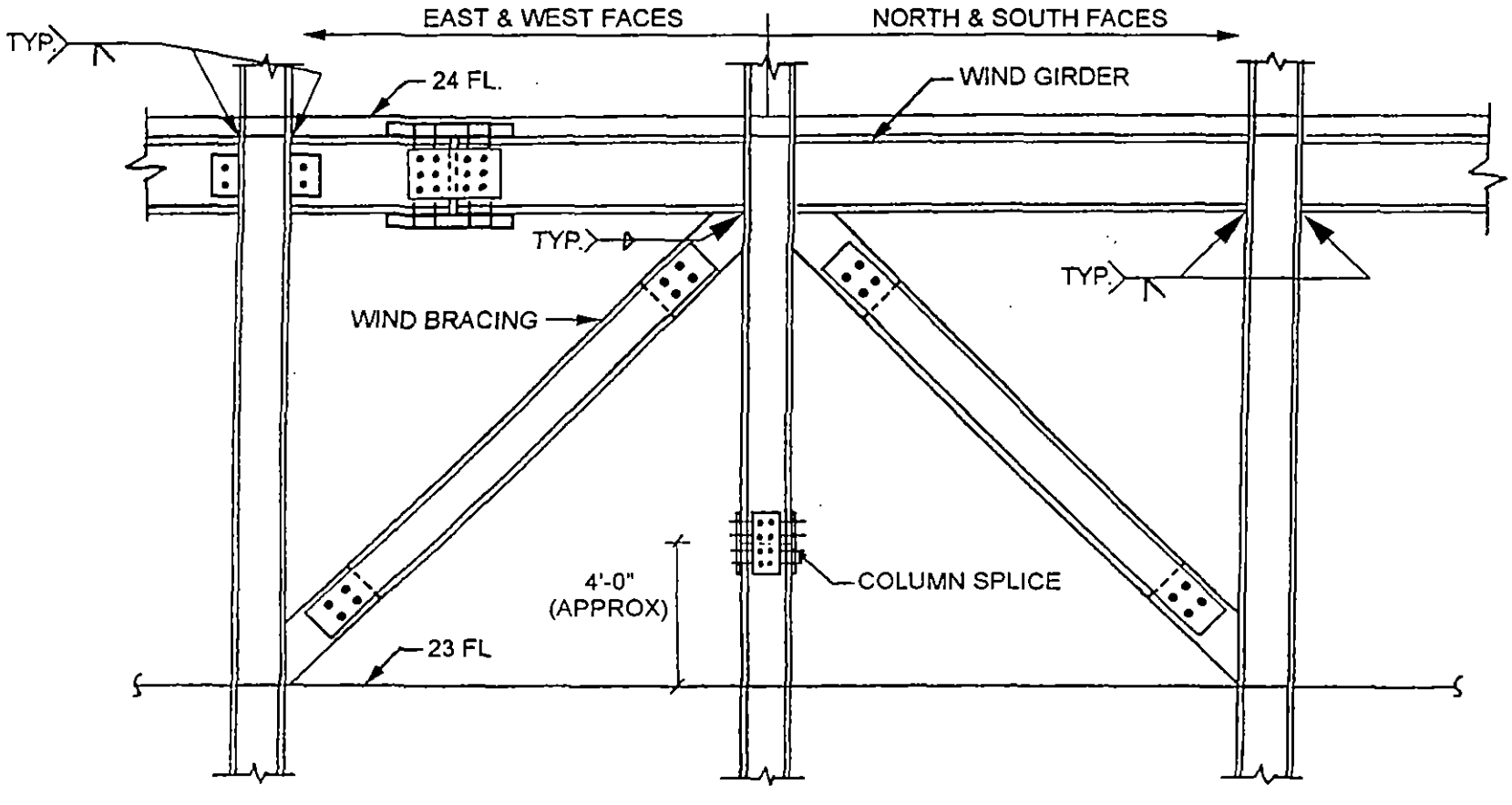



# SECTION A-A THRU NORTH FASCIA CANTILEVER

N.T.S.

FIG. 2

DRAWING S-17

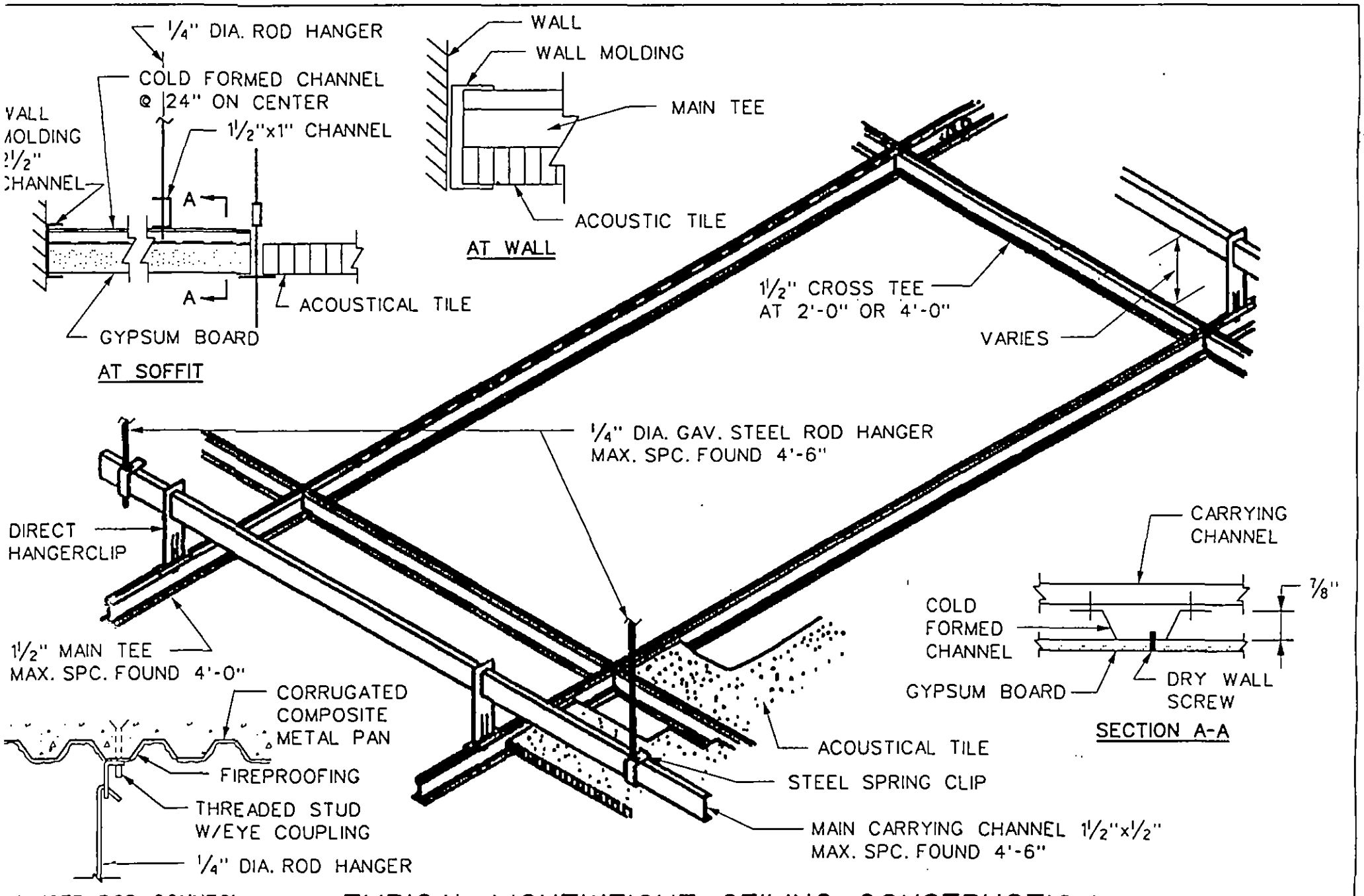



# DETAIL OF TYPICAL FRAMING WITH UPPER WIND BRACING

N.T.S.

DRAWING S-18

FIG.3




HANGER ROD CONNECTION TO UNDERSIDE OF FLOOR SLAB

# TYPICAL LIGHTWEIGHT CEILING CONSTRUCTION

N.T.S.

FIG. 4